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The Folly of Early Filing in Patent Law

CHRISTOPHER A. COTROPIA*

This Article questions the conventional wisdom that the patent system should continue to encourage “early filing” of patent applications—filing at the beginning stages of technological development. The current thinking regarding early filing fails to account for the lack of technical and market information available about the invention at the early stages of development. A “file early, file often” mentality is instilled in inventors, exacerbating such systemic patent problems as too many patent applications, too many patents, underdevelopment of patented technology, increased assertion of patent rights, and fuzzy patent boundaries, to name a few. The Article suggests that in response patent law should require that an invention be actually reduced to practice before examination—not a full-blown commercialization, but a real-world embodiment that demonstrates that the invention works for its intended purpose and the inventor has proceeded further down the development timeline.

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INTRODUCTION

Intellectual Ventures is a private company that sees invention as a full-time activity.¹ Instead of engaging in traditional product development, Intellectual Ventures produces “pure invention.”² To this end, the company has filed more than five hundred patent applications, inventing via one- to two-day “brainstorming sessions.”³ The company has also acquired thousands of additional patents as part of its overall strategy of looking for inventions addressing “problems that will need a solution 5–10 years from now.”⁴

IBM engages in a somewhat similar activity. For sixteen straight years, IBM has received more United States patents than any other company in the world.⁵ It received 4186 patents in 2008.⁶ This is the result

1. Press Release, Intellectual Ventures, Intellectual Ventures Files 500th Patent Application 2 (June 26, 2006), www.intellectualventures.com/docs/500apps.pdf.

2. *Id.*

3. *Id.* at 1; Intellectual Ventures—Frequently Asked Questions, <http://www.intellectualventures.com/Faq.aspx> (follow “How do you come up with your invention ideas?” hyperlink) (last visited Oct. 4, 2009) (“IV’s [Intellectual Venture’s] invention efforts center on ‘invention sessions’ which are multidisciplinary brainstorming events focused on a particular set of issues and possible solutions. IV typically hosts several 1–2 day invention sessions per month.”).

4. Intellectual Ventures—Frequently Asked Questions, *supra* note 3; Malcolm Gladwell, *In the Air: Who Says Big Ideas Are Rare?*, NEW YORKER, May 12, 2008, at 50; Michael Orey & Moira Herbat, *Inside Nathan Myhrvold’s Mysterious New Idea Machine*, BUS. WK., July 3, 2006, at 54 (describing the brainstorming technique used to produce inventions).

5. *See Patents*, CONSUMER ELECTRONICS DAILY, Jan 16., 2009, (IBM becoming the first company to pass the four-thousand-in-one-year mark).

of a deliberate business model intended to produce patents for the purpose of actively licensing them.⁷ IBM's efforts have been successful not only in producing a large number of patents,⁸ but also in generating approximately \$1 billion a year for the company.⁸

Intellectual Ventures and IBM are examples of a larger trend in patent law. The number of patents being applied for is growing exponentially, at a rate far greater than the growth of the U.S. economy.⁹ And patent holding companies—companies whose sole goal is to file and acquire patents—“have become commonplace in the modern patent system.”¹⁰ This situation has policymakers and scholars searching for a reason why patenting far outpaces actual innovation.¹¹

This Article provides an explanation for such patenting—patent rules that push inventors to file for patents early in the technological development process. The United States patent system actively encourages so-called “early filing.”¹² Early filing causes patents to be applied for well before a commercial use is identifiable.¹³ And while commentators have criticized the activities of Intellectual Ventures and IBM and the large number of undeveloped patents as socially harmful,¹⁴ no one really questions the early-filing doctrine that facilitates them.

6. *Id.*

7. See IBM Intellectual Property and Licensing, <http://www.ibm.com/ibm/licensing/> (last visited Oct. 4, 2009) (“In addition to delivering these innovations through its products and services, IBM maintains an active patent and technology licensing program.”).

8. See KEVIN G. RIVETTE & DAVID KLINE, REMBRANDTS IN THE ATTIC: UNLOCKING THE HIDDEN VALUE OF PATENTS 58 (2000) (stating IBM's licensing revenue as \$1 billion annually); Gideon Parchomovsky & R. Polk Wagner, *Patent Portfolios*, 154 U. PA. L. REV. 1, 8 (2005) (“[S]ince the mid-1990s, IBM has avowedly followed a portfolio-focused patenting strategy, which yielded a more than 400% increase in patent-related revenues (to about \$1.5 billion, or about a quarter of total corporate receipts) even as the research and development budget was slashed”); IBM Intellectual Property and Licensing, *supra* note 7.

9. See, e.g., Frederic M. Scherer, *The Political Economy of Patent Policy Reform in the United States* 28–29 (Harvard Univ. Kennedy Sch. of Gov't, Working Paper No. RWP07-042, 2007), available at <http://ssrn.com/abstract=963136>.

10. Blair Silver, *Controlling Patent Trolling With Civil RICO*, 11 YALE J.L. & TECH. 70, 72 (2009).

11. See, e.g., John R. Allison et al., *Valuable Patents*, 92 GEO. L.J. 435, 435–36 (2004) (labeling the question, “The Case of the Disappearing Patents”).

12. See Edmund W. Kitch, *The Nature and Function of the Patent System*, 20 J.L. & ECON. 265, 269–70 (1977) (describing the early filing nature of the U.S. patent system).

13. See *infra* Part III.A.

14. See, e.g., Michael Abramowicz, *The Danger of Underdeveloped Patent Prospects*, 92 CORNELL L. REV. 1065, 1066–67 (2007); Ian Ayres & Gideon Parchomovsky, *Tradable Patent Rights*, 60 STAN. L. REV. 863, 867–69 (2007) (describing the “line of analysis” that patenting activities such as IBM's lead to detrimental patent thickets); Nicholas Varchaver, *Who's Afraid of Nathan Myhrvold?*, FORTUNE, July 10, 2006, at 110 (describing industry concern over Intellectual Venture's potential assertion of its large patent portfolio).

In fact, many scholars have concluded that encouraging early filing is beneficial.¹⁵ Edmund Kitch, in describing his seminal “Prospect Theory” of patent law, identified the benefit to early filing as the end of wasteful rivalrous races to develop a given technology.¹⁶ The early filer can then use her exclusivity to efficiently manage and coordinate the invention’s technological and commercial development.¹⁷ John Duffy recently expanded on this line of thinking, noting that the earlier a patent is filed, the earlier the patent expires, and the earlier the claimed invention becomes part of the public domain.¹⁸

This discussion fails to recognize some fundamental facts, which are explored in this Article. First, early filing forces inventors to make filing decisions and draft applications with little technical or market information about the invention.¹⁹ Patent law encourages filing shortly after the invention is mentally conceived. At this stage of development, the inventor has gained no knowledge from the invention’s actual implementation and use.²⁰ Nor has the inventor been able to fully explore the invention’s commercial viability.²¹ Inventors must file—with little information and great uncertainty as to the invention’s worth—or risk losing their patent rights forever.²² Under these circumstances, most inventors file first and ask questions later.

Second, as time passes after the initial filing, more information about the invention is uncovered. This new information prompts the filing of more patent applications to cover variations of the invention that are now better-defined or shown to be of some commercial worth.²³ The current early-filing nature of the patent system, in the end, creates a “file early, file often” attitude, explaining the ever-rising number of undeveloped patents.²⁴

The United States patent system is intentionally structured to encourage patent filing early in an invention’s development. The patent system prompts early filing in two ways. First, it removes most barriers to early filing by not forcing the inventor to actually make the invention prior to filing or show that the invention successfully produces the

15. See, e.g., John F. Duffy, *Rethinking the Prospect Theory of Patents*, 71 U. CHI. L. REV. 439, 440 (2004); Kitch, *supra* note 12.

16. Kitch, *supra* note 12, at 265–66, 278–79.

17. *Id.* at 276–79.

18. Duffy, *supra* note 15, at 444, 475–80.

19. See *infra* Part III.A.2.

20. See *infra* Part III.A.1.a.

21. See *infra* Part III.A.1.b.

22. See *infra* Part III.B.

23. See *infra* Part III.B.2.

24. See *infra* Part III.B.2.

intended results.²⁵ Second, the system penalizes those who file later in the development process. The later one files, the later one's presumed date of invention and the greater the chance that some intervening development (some new "prior art") will render the invention no longer new or non-obvious in light of what has been done before, and thus unpatentable.²⁶

Pending legislation proposes to change the United States to a first-to-file patent system. Patents would be awarded not to the first to invent the invention, but the first to file a patent application claiming the invention.²⁷ Under the proposed first-to-file system, an even greater premium will be placed upon an early filing date, with the patent right going to the first filer even if she was not the first to invent.²⁸ This makes a critique of early filing especially timely.

Filing early and often exacerbates many of the patent system's most recognized problems. It adds significantly to the ever-rising number of applications, contributing to the backlog and burden on the United States Patent and Trademark Office (USPTO) that reduces the quality of examination and issued patents.²⁹ More applications means more issued patents, which cause problems of their own, particularly if they are "bad" patents.³⁰ The earlier patents are filed, the more likely they go undeveloped.³¹ Commercialization does not occur because of the great uncertainty and the minimal investment at the time of filing.³² Asserting an early-filed patent is a cheaper alternative to commercialization. This low-cost option entices patent trolls who use patents solely to extract rents from those engaged in commercial development.³³ The dearth of information and the great uncertainty at the time of filing also contributes to the lack of clarity in the patent's specification and claims, causing patent boundaries to be unclear.³⁴ A lack of adequate notice is seen by some as the root cause of the patent system's problems.³⁵

25. See *infra* Part I.A. (explaining the constructive reduction to practice doctrine and the utility requirement for patentability).

26. See 35 U.S.C. §§ 102–103 (2006) (setting forth the patentability requirements of novelty and non-obviousness); *infra* Part I.B.

27. See Patent Reform Act of 2009, S. 515, 111th Cong. § 2 (2009).

28. See *id.*; *infra* Part I.C.

29. See *infra* Part III.C.1. (explaining how more patent applications overburden the USPTO, which impedes the USPTO's ability to thoroughly review each application, resulting in erroneous determinations of patentability).

30. See *infra* Part III.C.1.

31. See *infra* Part III.C.2.

32. See *infra* Part III.C.2.

33. See *infra* Part III.C.3.

34. See *infra* Part III.C.4.

35. See JAMES BESSEN & MICHAEL J. MEURER, PATENT FAILURE: HOW JUDGES, BUREAUCRATS, AND LAWYERS PUT INNOVATORS AT RISK 8–14 (2006).

This Article offers a novel solution—moving examination to a later point in the development cycle. The solution attempts to optimize examination time to gain the benefits articulated by Kitch, Duffy, and others while allowing more information and greater certainty about the invention to be obtained prior to filing.³⁶ Doing so requires abolition of the current practice of allowing the patent application to substitute for actually building and implementing the invention. Instead, all inventors would be required to reduce their invention to practice before examination begins and, in turn, prior to the issuance of the patent. Having such a requirement would push examination further down the development timeline. More invention information would be available during examination, and this additional barrier to patenting would reduce the number of applications in need of examining and ultimately issued as patents. This new standard would bring with it significant flexibility, tailoring its requirements to industry practice.³⁷ Potential inventors would not be priced out of the incentives of the patent system, nor would the timing of patenting be pushed too far down the development process, as complete commercialization prior to filing would not be required.

The Article proceeds as follows: In Part I, the patent rules that encourage early filing are explored. Part II examines the previously-articulated benefits to early filing discussed by Kitch, Duffy, and others, and also recites the critiques of these benefits. Part III articulates the costs associated with an early filing system that have yet to be fully explored by other scholars. Part III begins by placing the early filing decision in the context of the typical new-technology development process and eventually concludes by exploring the many problems such a mentality creates—too many applications, too many patents, underdevelopment of patented technology, and increased assertion of patent rights, to name a few. Part IV proposes moving to an actual reduction to practice requirement to optimize examination time.

Recognizing the costs associated with early filing and the benefits of requiring an actual reduction to practice has far-reaching implications for the current patent discourse. Early filing exacerbates almost all of the major concerns with the patent system, including the rising number of applications, the underdevelopment of patented inventions, the creation of patent thickets, the problem of patent trolls, and the lack of notice of patent boundaries. Attempting to rectify the folly of early filing can go a long way in solving these systemic patent problems.

36. *See infra* Part IV.

37. *See infra* Part IV.C.

I. PATENT LAW RULES THAT ENCOURAGE EARLY FILING

United States patent law, and in fact most national patent system law, has long encouraged inventors to file their patent applications shortly after the invention's conception. This encouragement is achieved in two ways. First, patent law removes many of the potential barriers to early filing by having no actual reduction to practice requirement, a lax utility requirement, and the ability to file a provisional application. Second, patent law incentivizes inventors to take advantage of the ability to file early by creating a strong presumption that the filing date is the date of invention and implementing a one-year statutory bar. Patent law pushes the inventor to file early to increase the likelihood of the patent's validity. This incentive to file early will become greater if the United States moves to a first-to-file system, currently implemented by almost every country's patent system.

A. LACK OF BARRIERS TO EARLY FILING

1. *No Actual Reduction to Practice Requirement*

A fundamental requirement of patent law is that the act of invention must occur prior to patent protection.³⁸ Likewise, an applicant must be the inventor of the subject matter claimed by her patent application.³⁹ A specific definition of the act of "inventing" is used to determine whether the invention requirement is met. The process of invention involves two steps—conception and reduction to practice—and is not considered completed until the performance of the second step.⁴⁰

Conception, the first step of inventing, involves the mental formation of the complete invention.⁴¹ Conception entails more than merely identifying a problem that needs to be solved or visualizing an abstract solution. The mental picture of the solution must be specific and contain enough detail to enable a person having ordinary skill in the art

38. 1 WILLIAM C. ROBINSON, *THE LAW OF PATENTS* 91 (Boston, Little, Brown, & Co. 1890) ("An inventor, in the meaning of the Constitution, is one who has himself conceived the fundamental idea of the invention To him and to him only can a patent lawfully be granted.").

39. 35 U.S.C. § 102(f) (2006) (barring patent protection if the applicant "did not himself invent the subject matter sought to be patented").

40. *See id.* § 102(g). Notably these two steps of invention—conception and reduction to practice—can occur simultaneously. The typical scenario is that a complete formulation of the invention does not take place until reduction to practice is completed. *See, e.g.,* *Amgen, Inc. v. Chugai Pharm. Co.*, 927 F.2d 1200, 1206 (Fed. Cir. 1991) ("In some instances, an inventor is unable to establish a conception until he has reduced the invention to practice through a successful experiment. This situation results in a simultaneous conception and reduction to practice.").

41. "Conception is the 'formation in the mind of the inventor, of a definite and permanent idea of the complete and operative invention, as it is hereafter to be applied in practice.'" *Hybritech Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 1376 (Fed. Cir. 1986) (quoting 1 ROBINSON ON PATENTS 532 (1890)).

(PHOSITA) to make or perform the invention.⁴² Conception finishes with the “exterior expression of the mind of the inventor” in the form of a writing, oral communication, or model.⁴³

There are two ways to reduce an invention to practice and complete the final step of inventing. An inventor may actually reduce the invention to practice by physically implementing the invention and, in the process, demonstrating the invention works as intended.⁴⁴ Actual reduction to practice is taking the conceived invention out of the inventor’s head, making it exist in real space, and showing that it works.⁴⁵

Patent law has long recognized a legal fiction that substitutes for actual reduction to practice—constructive reduction to practice.⁴⁶ An invention is considered constructively reduced to practice when the invention is described in a patent application that includes a description of the invention that meets patent law’s disclosure requirements.⁴⁷ That is, the patent application must meet the requirements of 35 U.S.C. § 112, paragraph 1—adequately describe, enable, and convey the best mode of the invention—to count as a reduction to practice.⁴⁸

The ability to meet the second step of invention—reduction to practice—constructively removes a potential barrier to filing for a patent early in the development process. An applicant need only conceive of the invention and, by filing for a patent that is valid, she necessarily meets the reduction to practice requirement.⁴⁹ The invention does not need to be built or actually implemented, nor does an applicant need to make

42. See *Burroughs Wellcome Co. v. Barr Labs., Inc.*, 40 F.3d 1223, 1228 (Fed. Cir. 1994) (“Conception is complete only when the idea is so clearly defined in the inventor’s mind that only ordinary skill would be necessary to reduce the invention to practice, without extensive research or experimentation.”); *Oka v. Youssefeyeh*, 849 F.2d 581, 583 (Fed. Cir. 1988) (noting that conception requires an idea as to the invention’s structure and an operative way of making it).

43. *Mergenthaler v. Scudder*, 11 App. D.C. 264, 278 (D.C. Cir. 1897). This is mainly for proof purposes. See *Burroughs Wellcome*, 40 F.3d at 1228 (“Because it is a mental act, courts require corroborating evidence of a contemporaneous disclosure that would enable one skilled in the art to make the invention.”).

44. See *Medichem, S.A. v. Rolabo, S.L.*, 437 F.3d 1157, 1169 (Fed. Cir. 2006).

45. See *Cooper v. Goldfarb*, 154 F.3d 1321, 1327 (Fed. Cir. 1998).

46. See, e.g., Warren H. Willner, *Origin and Development of the Doctrine of Constructive Reduction to Practice*, 36 J. PAT. OFF. SOC’Y 618 (1954).

47. See *Hyatt v. Boone*, 146 F.3d 1348, 1352–54 (Fed. Cir. 1998) (noting that the application must meet the written description requirement for the filed claims to be considered constructive reductions to practice); *Bigham v. Godtfredsen*, 857 F.2d 1415, 1416 (Fed. Cir. 1988) (indicating that a patent disclosure must meet the requirement of 35 U.S.C. § 112 to constructively reduce to practice a particular claim).

48. 35 U.S.C. § 112 (2006) (articulating the disclosure requirements).

49. See *Hoffmann-La Roche, Inc. v. Promega Corp.*, 323 F.3d 1354, 1377 (Fed. Cir. 2003) (“‘Constructive reduction to practice’ is a legal status unique to the patent art. Unlike the rules for scientific publications, which require actual performance of every experimental detail, patent law and practice are directed to teaching the invention so that it can be practiced.”)

sure the invention works for its intended purpose.⁵⁰ The mental solution just needs to be written down with enough specificity and detail to disclose the invention and enable others skilled in the art to practice it.

Other patent doctrines further lower the barrier to meeting the invention requirement. The patent application, which serves as a proxy for an actual reduction to practice, need only include a level of detail needed for a PHOSITA to practice the invention. This means that certain implementation details that would fall within this skill level need not be disclosed.⁵¹ The patent's description of the invention can also have holes that are filled with an acceptable level of experimentation. As long as the person having skill in the art does not need to engage in "undue" experimentation, the patent application has provided enough detail to qualify for a constructive reduction to practice and the ultimate completion of the process of invention.⁵² The description of the invention is viewed through this lens—a PHOSITA engaged in reasonable experimentation—and therefore does not need to include many of the details of the invention's implementation.

All of these legal constructs combine to minimize the demands on the inventor prior to filing. The inventor does not need to actually implement or recognize the success of her invention because of the constructive reduction to practice doctrine. The flexibility inherent in the disclosure requirements—with the patent application supplemented with the knowledge of a PHOSITA and some experimentation—lessens the specificity of the inventor's articulation of her invention. The inventor need only conceive of the invention and not much more to invent under U.S. patent law.⁵³

There is one caveat. Since the level of specificity is tied to skill in the art and level of experimentation needed, the more unpredictable the area of technology, the more that needs to be disclosed.⁵⁴ Thus, for

50. See *Lawson v. Bruce*, 222 F.2d 273, 278 (C.C.P.A. 1955) ("There is no requirement . . . that a party relying on a constructive reduction to practice to establish priority of invention must show a specific working example to support the compound claimed.").

51. *In re Gay*, 309 F.2d 769, 774 (C.C.P.A. 1962).

52. See *AK Steel Corp. v. Sollac*, 344 F.3d 1234, 1244 (Fed. Cir. 2003) ("[The specification itself need not] necessarily describe how to make and use every possible variant of the claimed invention, for the artisan's knowledge of the prior art and routine experimentation can often fill gaps, interpolate between embodiments, and perhaps even extrapolate beyond the disclosed embodiments, depending upon the predictability of the art.").

53. *Pfaff v. Wells Elecs., Inc.*, 525 U.S. 55, 60 (1998) ("The primary meaning of the word 'invention' in the Patent Act unquestionably refers to the inventor's conception rather than to a physical embodiment of that idea."). This is why it is often said that "[c]onception is the touchstone of inventorship." See *Burroughs Wellcome Co. v. Barr Labs., Inc.*, 40 F.3d 1223, 1227-28 (Fed. Cir. 1994).

54. Dan Burk & Mark Lemley, *Policy Levers in Patent Law*, 89 VA. L. REV. 1575, 1653-54 (2003) (noting that the written description requirement is "a sort of 'super-enablement' requirement" in the biotechnology field).

chemical and biotechnology areas, more information is needed for valid specification that includes the required level of implementation detail. Accordingly, in order to provide this additional detail, more needs to be done by the inventor in these technological arts and the barrier to filing early is not as low.

2. *Lax Utility Requirement*

An invention must also meet the utility requirement to gain patent protection.⁵⁵ To meet this requirement, the invention must be capable of some beneficial use.⁵⁶

As applied, the utility requirement is easy to meet for most inventions.⁵⁷ While the invention must have a beneficial use, the level of benefit necessary is very low. Patent law simply requires that the invention have some benefit. There is no evaluation as to whether the invention is useful enough—that is, whether it will provide a certain quantum of benefit for society.⁵⁸ For example, the invention does not need to be commercially viable.⁵⁹ The utility requirement also does not require that the inventor submit test data to “prove” that the invention is operable and capable of its intended use.⁶⁰ The inventor need only provide a technical description of the invention that would teach a PHOSITA how to operate the invention.⁶¹ In fact, under the current patent examination guidelines, examiners must presume operability of the invention.⁶² For most technological areas, the utility requirement is a nonrequirement.

55. 35 U.S.C. § 101 (2006).

56. *Fuller v. Berger*, 120 F. 274, 275 (7th Cir. 1903) (articulating the test for utility as questioning whether the invention “is incapable of serving any beneficial end”).

57. See *Juicy Whip, Inc. v. Orange Bang, Inc.*, 185 F.3d 1364, 1366 (Fed. Cir. 1999) (“The threshold of utility is not high.”); *Brooktree Corp. v. Advanced Micro Devices, Inc.*, 977 F.2d 1555, 1571 (Fed. Cir. 1992) (“To violate § 101 the claimed device must be totally incapable of achieving a useful result . . .”).

58. Justice Story articulated the requirement as excluding those inventions that are “injurious to the well-being, good policy, or sound morals of society.” See *Lowell v. Lewis*, 15 F. Cas. 1018, 1019 (C.C.D. Mass. 1817) (No. 8568). However, even this view of utility—excluding only inventions with “negative” utility—has lost favor with the courts. See, e.g., *Juicy Whip*, 185 F.3d at 1366–67 (cataloging cases where patents on gambling devices, which are arguably socially harmful, were found to meet the utility requirement).

59. *Duffy*, *supra* note 15, at 453 (“Simply put, patent law has no aversion to awarding commercially worthless property rights.”); *Kitch*, *supra* note 12, at 269 (“The patent application need not disclose a device or process of any commercial value, only a version of the invention that will work.”).

60. See *In re Chilowsky*, 229 F.2d 457, 462 (C.C.P.A. 1956) (“[I]n the usual case where the mode of operation alleged can be readily understood and conforms to the known laws of physics and chemistry, operativeness is not questioned, and no further evidence is required.”).

61. See 1 DONALD S. CHISUM, CHISUM ON PATENTS § 4.04(1) (2009).

62. *In re Swartz*, 232 F.3d 862, 863–64 (Fed. Cir. 2000); *Fregeau v. Mossinghoff*, 776 F.2d 1034, 1038 (Fed. Cir. 1985). The presumption is usually only overcome in patents making remarkable claims.

This low utility requirement removes another barrier to filing for a patent shortly after conception. If patent law required a use of a certain commercial or social worth, an inventor would need to take time to establish that her invention provides this level of benefit before filing.⁶³ She would need to find a commercially beneficial use for her invention. Then she would need to produce the data necessary to prove that her invention actually generated such a benefit. Put simply, an inventor would need to further develop her invention and investigate its uses before filing for a patent in order to meet such a heightened utility requirement. This additional proof is just not required under the current utility standard for patentability.

There is a notable exception to patent law's lax utility requirement. In the biology and chemistry fields, patent law has applied a heightened utility requirement.⁶⁴ For inventions in these technology areas, the invention must have some "terminal application" and there must be proof that the invention can achieve this ultimate use.⁶⁵ For example, new chemicals and the processes that produce them meet the utility requirement only if a specific, practical use for the produced chemical has been identified.⁶⁶ In addition, patents claiming pharmaceuticals must at least describe the indicators, such as in vitro tests or animal modeling, that show the drug's therapeutic efficacy.⁶⁷ And for expressed sequence tags (ESTs) in the biotechnology area, the inventor must identify a currently-known function for the EST.⁶⁸ For these inventions, utility means "an immediate, well-defined, real world benefit to the public meriting the grant of a patent" that goes beyond mere operability and some use.⁶⁹

Accordingly, this heightened utility standard stands as an additional barrier to early filing in these technological areas. The inventor necessarily needs to do more, both in establishing the usefulness of her invention and finding the data to prove it. The utility requirement invalidates those patents that are filed too early because an ultimate end-use of the chemical or pharmaceutical has not been established.

See, e.g., *Swartz*, 232 F.3d at 864 (affirming the USPTO's determination that a patent claiming cold fusion was not operable).

63. *Kitch*, *supra* note 12, at 269 (noting that the lack of a commercial worth requirement allows "the applicant [to] proceed from the first positive results to the patent office").

64. *Burk & Lemley*, *supra* note 54, at 1644-45.

65. *Id.* at 1644.

66. *Brenner v. Manson*, 383 U.S. 519, 534-35 (1966).

67. *In re Brana*, 51 F.3d 1560, 1567 (Fed. Cir. 1995).

68. *In re Fisher* 421 F.3d 1365, 1369-71 (Fed. Cir. 2005).

69. *Id.* at 1376.

3. Availability of Provisional Applications

The availability of filing a “provisional application” removes another potential barrier to filing early for patent protection. Introduced in the United States in 1994, a provisional application is an application that is designated to not be examined, but instead acts as a placeholder for a nonprovisional (i.e., real) application to be filed not more than twelve months later.⁷⁰

The significance of provisional applications is two-fold. First, a provisional application establishes an application’s filing date so that, when converted to a nonprovisional application within a year from the date of the provisional’s filing, the patent application is considered filed as of the date of the provisional.⁷¹ In turn, a provisional application, by giving a patent application as much as a year-earlier filing date, de facto adds up to one additional year to the twenty-year patent term.⁷² That is, the nonprovisional patent application’s filing date starts the twenty-year term clock ticking, but if a provisional is filed, the effective filing date is a year earlier without starting the term clock.⁷³

Provisional applications remove additional barriers to early filing. The fees for filing a provisional application are lower than filing a normal application.⁷⁴ This removes some of the cost of filing early. In addition, a provisional application does not need to include any patent claims.⁷⁵ Claims need only be added when the provisional is converted to an application for examination within the one-year window. This lowers the costs of filing early even more by removing the need to pay a patent attorney to get the patent application completely “in order” and draft

70. 35 U.S.C. § 111(b) (2006) (defining the provisional application).

71. *Id.*; *id.* § 119(e); 37 C.F.R. § 1.53(c)(2) (2008); Robert A. Migliorini, *Twelve Years Later: Provisional Patent Application Filing Revisited*, 89 J. PAT. & TRADEMARK OFF. SOC’Y 437, 441–42 (2007).

72. Migliorini, *supra* note 71, at 439 (“The primary purpose of implementing the option for provisional application filing was to give U.S. inventors the opportunity to obtain an initial filing date that does not serve as the basis from which the 20-year term of patent protection is measured.”).

73. Changes to Implement 20-Year Patent Term and Provisional Applications, 60 Fed. Reg. 20195, 20205 (Apr. 25, 1995) (to be codified at 37 C.F.R. pts. 1, 3).

74. See Migliorini, *supra* note 71, at 444.

Another benefit of provisional filing is that it may allow an applicant to obtain an earlier priority filing date at a relatively low cost then [sic] may be otherwise available if filing non-provisionally. The filing fee is \$100 lower than a non-provisional filing, and more importantly, there are no excess claims fees.

Id. The average attorney fees for preparing a provisional application is \$4384 compared to \$9412 for a relatively complex nonprovisional application on a mechanical invention. AM. INTELLECTUAL PROP. LAW ASSOC., AIPLA REPORT OF THE ECONOMIC SURVEY 2007, at I-78 to -79 (2007) [hereinafter AIPLA REPORT].

75. 35 U.S.C. § 111(b)(2).

patent claims.⁷⁶ The inventor also gets a year to gather the additional resources needed to file the actual patent application.

While facilitating early filing, the information in a provisional is still important. In order to enjoy the provisional's filing date, the provisional application must fully support the claims included in the nonprovisional patent application.⁷⁷ The claims must be described and enabled by the provisional application. Accordingly, the inventor must put some thought and time into the drafting of a provisional application for the early filing to be worthwhile. But the availability of an early placeholder—which gives an inventor another year to both decide whether she wants to devote the full resources to filing a patent application and obtain the resources needed to file—adds another way the patent system removes potential barriers to filing early.

B. INCENTIVES TO FILE EARLY

1. *Filing Date Is the Presumed Invention Date*

Determining the date of invention is a critical step in deciding whether a claimed invention is patentable. An invention's novelty and non-obviousness are judged with respect to the date of invention.⁷⁸ Everything done before the date of invention is eligible to be "prior art" to the claimed invention.⁷⁹ The prior art is compared to the claimed invention to determine whether the invention has been previously done—it is anticipated and thus not novel⁸⁰—or the invention is not a large enough technological development over what has already been done—it is obvious.⁸¹ Put simply, a patent can only be defeated by that which was done prior to the invention's creation date.

It follows that the earlier the date of invention, the more likely an invention will be patentable. The earlier the date of invention, the smaller the universe of potential prior art. The less prior art available to compare to the claimed invention, the more likely the invention is novel

76. "Because of the numerous challenges presented by patent claim drafting, the Supreme Court long ago recognized that a patent specification is one of the most difficult legal documents to draw with accuracy." Robert D. Katz & Steven J. Lee, *Advanced Claim Drafting and Amendment Writing for Chemical Inventions*, in SIXTH ANNUAL PATENT PROSECUTION WORKSHOP: ADVANCED CLAIM AND AMENDMENT WRITING 335, 339 (PLI Patents, Copyrights, Trademarks, & Literary Prop., Course Handbook Series No. G4-3977, 1996) (citing *Topliff v. Topliff*, 145 U.S. 156 (1892)).

77. 35 U.S.C. § 111(b)(1).

78. *See id.* § 102(a), (g) (denying patent protection if certain events occur "before the invention"); *id.* § 103(a) (determining obviousness from the perspective of a PHOSITA "at the time the invention" was made); Mark A. Lemley, *The Changing Meaning of Patent Claim Terms*, 104 MICH. L. REV. 101, 106 (2005).

79. *See* 35 U.S.C. § 102(a). The definition of prior art expands to include activities after the date of invention. *See id.* § 102(b).

80. *Id.* § 102(a).

81. *Id.* § 103(a).

and non-obvious. Essentially, the level of technological progress the invention is compared against becomes lower the earlier the date of comparison.

An earlier invention date also benefits an inventor if there is a contest as to priority of inventorship. Patent law in the United States awards the patent to the first to invent.⁸² So if there is a contest between two inventors, the rights to exclusivity over the invention are essentially awarded to the one to invent first.⁸³ Under these rules, the earlier the date of invention, the more likely one is to win a priority contest.

The filing date is relevant to the date of invention because patent law presumes the filing date *is* the date of invention.⁸⁴ The earlier the filing date, the earlier patent law presumes the invention was created. The burden then lies on the USPTO or defendant, depending on the venue, to disprove this presumed date of invention.⁸⁵ And given that the filing of a patent application that meets the disclosure requirements qualifies as a constructive reduction to practice and evidence of conception, overcoming this burden is extremely difficult.

Just as it is difficult to defeat the presumption and move the invention date later in time, it is equally hard to establish an invention date earlier than the filing date. Patent law employs a heightened evidentiary standard to establish an earlier date of conception.⁸⁶ There must not only be some external evidence of conception at an earlier date, there must also be corroboration of this conception.⁸⁷ Meeting this evidentiary burden is difficult. Before the USPTO, an applicant must “swear behind” the filing date to get an early date of invention.⁸⁸ During litigation, a patentholder must meet this high standard for proving conception.⁸⁹ The same holds true for priority disputes.⁹⁰ The difficulty in meeting this standard in all of these settings is evidenced by the fact that

82. *See id.* § 102(e).

83. The determination of priority is actually more complex. *See id.* § 102(g) (defining the standard for determining priority between two inventors of the same technology); *Cooper v. Goldfarb*, 154 F.3d 1321, 1327 (Fed. Cir. 1998) (articulating the standard in reverse, noting that “priority of invention goes to the first party to reduce an invention to practice unless the other party can show that it was the first to conceive of the invention and that it exercised reasonable diligence in later reducing that invention to practice”); ROBERT P. MERGES & JOHN F. DUFFY, *PATENT LAW AND POLICY: CASES AND MATERIALS* 440–41 (3d ed. 2002).

84. 37 C.F.R. § 1.657(a) (2008); *Brown v. Barbacid*, 276 F.3d 1327, 1332–33 (Fed. Cir. 2002) (articulating the rebuttable presumption that the filing date is the invention date).

85. *Supra* note 84.

86. Christopher A. Cotropia, *Patent Law Viewed Through an Evidentiary Lens: The “Suggestion Test” as a Rule of Evidence*, 2006 BYU L. REV. 1517, 1585–87.

87. *See Cooper*, 154 F.3d at 1330; *Allen v. Blaisdell*, 196 F.2d 527, 529 (C.C.P.A. 1952); Cotropia, *supra* note 86.

88. 37 C.F.R. § 1.131.

89. *Loral Fairchild Corp. v. Matsushita Elec. Indus. Co.*, 266 F.3d 1358, 1361 (Fed. Cir. 2001).

90. *Cooper*, 154 F.3d at 1330.

in most priority disputes, the earlier filing date wins priority.⁹¹ And even if the standard for proving an earlier date of invention is met, the process of getting there, which relies heavily on testimony and written evidence, is costly.⁹²

In light of the benefits of an early date of invention, the presumption assigned to the filing date, and the difficulty of proving an earlier date of invention, patent law creates a strong incentive to file early. Filing early gives the inventor an early date of invention, which constricts the universe of available prior art. And given that it is both difficult and costly to prove a date of invention prior to the filing date, the inventor knows that the filing date is most likely going to be the date of invention. This means that the earlier one files, the more likely one's application is valid.

2. *One-Year Statutory Bar to Patentability*

Even if an inventor can prove a date of invention earlier than the filing date, the filing date is relevant to another patentability requirement—the statutory bar. Section 102(b) renders a patent invalid if it claims an invention that was described in a printed publication, in public use, or offered for sale more than one year prior to the filing date.⁹³ The impact of this statutory bar is that activities after the date of invention, but more than one year prior to the filing date, can render the patent invalid. These activities that qualify as prior art under § 102(b) can include publications or offers for sale from the inventor herself that occur more than one year before filing.⁹⁴

Filing date, therefore, means more than getting an early invention date. The earlier the filing date, the earlier in time the one-year window exists. And, as noted above, the older the prior art compared to the invention, the less likely the prior art renders the invention anticipated or obvious. An earlier filing date also narrows the window between the date of invention and the filing date. The smaller this window, the less

91. See Mark A. Lemley & Colleen Chien, *Are the U.S. Patent Priority Rules Really Necessary?*, 54 HASTINGS L.J. 1299, 1317 (2003) (“Indeed, our analysis suggests that in more than half of the cases in which the senior party won a priority contest, and more than a third of total cases, the senior party needed to do no more than prove its filing date, suggesting that the entire proceeding was a waste of time.”). But Lemley and Chien did find that, while first filers won in a majority of USPTO and district court proceedings, junior parties fared better on appeal. *Id.* at 1312–13 (including possible explanations for such a discrepancy).

92. See *Woodland Trust v. Flowertree Nursery, Inc.*, 148 F.3d 1368, 1371 (Fed. Cir. 1998) (detailing the factors for evaluating the physical evidence and oral testimony required to establish corroboration).

93. 35 U.S.C. § 102(b) (2006) (invalidating a claim if the claimed “invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of the application for patent in the United States”).

94. See *id.*

publications and offers for sale of the invention that can take place more than one year before filing and thus invalidate the patent under § 102(b).⁹⁵ This is particularly true for prior art created by the inventor, who is unable to publish or offer for sale the invention before she actually conceives of the invention. Early filing, therefore, provides the additional benefit of making a patent less susceptible to a statutory-bar challenge. The earlier an inventor files, the less exposed her invention is to statutory bar-oriented prior art.⁹⁶

The statutory bar, by both making activities after the date of invention and the inventor's own activities relevant to patentability, magnifies the benefits of filing early. And this strong incentive to file early created by the statutory bar is purposeful. One of the explicit rationales behind the statutory bar is to push inventors to file early.⁹⁷ While the United States employs a first-to-invent system, it still encourages inventors to file for patent protection sooner rather than later.⁹⁸ The statutory bar serves this function, preventing inventors from enjoying the benefits of the patented technology, via commercial development and public use, outside the twenty-year exclusivity period that starts at the filing date.⁹⁹

C. MOVE TO FIRST-TO-FILE SYSTEM MAGNIFIES INCENTIVES TO FILE EARLY

The United States is unique in that its patent system awards patent rights to the first to invent, not the first to file a patent application. Almost all other countries utilize a first-to-file system—the first inventor to file for a patent, even if they are the second to invent, is awarded the patent rights to the invention.¹⁰⁰

The United States is currently contemplating moving to a first-to-file system.¹⁰¹ If such a change takes place, the incentives to file early

95. MERGES & DUFFY, *supra* note 83, at 541–42 (“As the inventor continues to delay filing, more and more material becomes potentially relevant under § 102(b).”).

96. *Id.* (noting that an inventor who files within one year of inventing “has nothing to fear from § 102(b) because no references qualify under § 102(b) that do not *also* qualify under § 102(a)”).

97. 2 DONALD S. CHISUM, CHISUM ON PATENTS § 6.01 (2008).

98. *See id.* There is some flexibility in the form of the experimental-use exception. *See, e.g., Atlanta Attachment Co. v. Leggett & Platt, Inc.*, 516 F.3d 1361, 1365–66 (Fed. Cir. 2008).

99. *See, e.g., Pfaff v. Wells Elecs., Inc.*, 525 U.S. 55, 64 (1998) (noting that one of the purposes of § 102 is to “confin[e] the duration of the monopoly to the statutory term”); *Pennock v. Dialogue*, 27 U.S. (2 Pet.) 1, 19 (1829) (“A provision, therefore, that should withhold from an inventor the privilege of an exclusive right, unless he should, as early as he should allow the public use, put the public in possession of his secret, and commence the running of the period, that should limit that right; would not be deemed unreasonable.”).

100. *See* Brad Pedersen & Vadim Braginsky, *The Rush to a First-to-File Patent System in the United States: Is a Globally Standardized Patent Reward System Really Beneficial to Patent Quality and Administrative Efficiency?*, 7 MINN. J.L. SCI. & TECH. 757, 764–65 (2006).

101. *See* Patent Reform Act of 2009, S. 515, 111th Cong. § 2 (2009).

become magnified.¹⁰² No longer will it just be the presumption that the filing date is the invention date pushing an inventor to file early. Instead, the inventor will file early because the earlier she files, the more likely she will be the first to file. In a sense, a first-to-file system replicates the early filing incentives created by the statutory bar, but without the one-year grace period. The inventor needs to file early because the filing date, not the date of invention, determines priority amongst competing inventors. Filing as early as possible—which would be at the time of conception—is the best course to protect one's right to patent exclusivity over the invention he or she created.

II. PREVIOUSLY ARTICULATED BENEFITS TO EARLY FILING

Many have recognized and applauded the early-filing nature of the patent system. Edmund Kitch, in his Prospect Theory, is probably the most notable champion of early filing.¹⁰³ He argues that early filing both facilitates commercialization of the invention and helps to minimize wasteful races to invent and patent.¹⁰⁴ John Duffy recently built upon Kitch's work and made the observation that, by incentivizing early filing, the patent system causes patents to expire earlier than they would otherwise.¹⁰⁵ These three previously articulated benefits to early filing are explored below, including the criticisms lodged against these positions.

A. FACILITATING COMMERCIALIZATION OF THE INVENTION

Edmund Kitch, in articulating his Prospect Theory of patent law, identified the early-filing nature of the patent system as one of the tools that furthered the prospect nature of the system. Kitch's Prospect Theory views the patent system as granting exclusivity over prospects—"particular opportunit[ies] to develop a known technological possibility"—and facilitating their development.¹⁰⁶ By requiring inventors to file early, and in turn to receive protection early in the development process, the patent system gives inventors patent protection at the beginning of the technology's development.¹⁰⁷ Protection at this early

102. Pedersen & Braginsky, *supra* note 100, at 772. Given the results of Lemley and Chien's empirical study on inventorship disputes, the U.S. system already de facto acts as a first-to-file system. See Lemley & Chien, *supra* note 91, at 1312-13.

103. See Kitch, *supra* note 12, at 265-66, 278-79 (setting forth the Prospect Theory of patents).

104. *Id.* at 269-70.

105. Duffy, *supra* note 15, at 444.

106. Kitch, *supra* note 12, at 266.

107. *Id.* at 269 ("The second important feature of the patent system which makes it function as a prospect system are rules which force and permit application early in the development process.").

stage facilitates and maximizes the efficient development and improvement of the patented invention.¹⁰⁸

Kitch catalogs the many advantages of granting exclusivity early in an invention's development. Early protection allows the patent owner to coordinate the development and improvement of the patented technology,¹⁰⁹ minimizes duplication of efforts amongst multiple developers,¹¹⁰ and facilitates the exchange of information.¹¹¹ Providing protection early also gives the inventor the necessary breathing room to further develop her invention.¹¹² She can share information about her technology with others without fear of misappropriation.¹¹³ By obtaining patent exclusivity early in development, the inventor can also save on costly expenditures to maintain the secrecy of her invention.¹¹⁴

The Prospect Theory's premise that patenting facilitates commercialization is not without its critics. Robert Merges and Richard Nelson argue that rivalrous, as opposed to coordinated, development better facilitates the sequential improvement of invented technologies.¹¹⁵ Merges and Nelson contend that they can present empirical evidence that rivalry produces rapid technical advancement, while the granting of broad patent rights typically suppresses such progress.¹¹⁶ Mark Lemley comes to a similar conclusion, questioning whether "a single company is better positioned than the market to make efficient use of an idea."¹¹⁷ There is good reason that the market, not an exclusive controller, produces better development and improvement of a patented idea. Furthermore, as Lemley points out, "[c]reators are often terrible managers" and "frequently misunderstand the significance of their own invention and the uses to which it can be put."¹¹⁸

However, even Lemley agrees that in certain technological fields, such as pharmaceutical development, patent protection may play a crucial role in development post-patenting. In the case of pharmaceuticals, "control over subsequent development is a necessary

108. *Id.* at 266.

109. *Id.* at 276.

110. *Id.* at 278-79.

111. *Id.* at 277-78.

112. *Id.* at 276-77 ("[T]he patent owner has an incentive to make investments to maximize the value of the patent without fear that the fruits of the investment will produce unpatentable information appropriable by competitors.").

113. *Id.* at 277-78.

114. *Id.* at 279.

115. Robert P. Merges & Richard R. Nelson, *On the Complex Economics of Patent Scope*, 90 COLUM. L. REV. 839, 872-77 (1990).

116. *Id.* at 877.

117. Mark A. Lemley, *Ex Ante Versus Ex Post Justifications for Intellectual Property*, 71 U. CHI. L. REV. 129, 135-37 (providing examples of his argument under copyright law).

118. *Id.* at 137.

part of the incentive to produce the pioneering invention in the first place.”¹¹⁹ The need for this control over development is due to the high costs associated with bringing a developed drug to market.¹²⁰ Exclusivity from development to Food and Drug Administration (FDA) approval is needed to encourage pharmaceutical companies to invest in the initial-stage research.¹²¹

Notably, nothing in Merges and Nelson’s or Lemley’s critiques specifically discredits the benefits of an early filing system. Their disagreement is with the Prospect Theory in general, not the legitimacy of an early filing regime. The critiques focus on the question of the breadth of the patent right, not the timing of the grant. They critique Kitch’s conclusion that central control promotes technological progress. They say nothing about the stage of development in which control is given. While these arguments have some applicability to the early filing nature of the patent system, they are not direct rebuttals.¹²²

In addition, in this back and forth, no one really questions patent law’s need to provide protection at some time short of the moment of full commercialization. Failure to provide protection before this point would severely impact the *ex ante* incentives to engage in the basic development patent law attempts to encourage.¹²³ The farther down the development chain patent protection attaches, the more uncertain a potential inventor is that she can eventually gain exclusive protection to recoup research and development costs.¹²⁴ Erecting patent rules that disallow filing for patent protection until very late in the development game may deter inventing altogether. This, in turn, would affect commercialization because the invention would never be created in the first place. So while there is nothing close to consensus regarding Kitch’s Prospect Theory, there is at least some consensus as to the positive relationship between early filing and the commercialization of the patented invention.

119. *Id.* at 141.

120. Abramowicz, *supra* note 14, at 1095–96.

121. *Id.*

122. For example, one could imagine an early filing system that provides narrow rights and therefore allows rivalrous development and decentralized control of improvements to the originally patented technology.

123. See WILLIAM M. LANDES & RICHARD A. POSNER, *THE ECONOMIC STRUCTURE OF INTELLECTUAL PROPERTY LAW* 294 (2003) (“The standard rationale of patent law is that it is an efficient method of enabling the benefits of research and development to be internalized, thus promoting innovation and technological progress.”); CRAIG A. NARD, *THE LAW OF PATENTS* 28–29 (2008) (describing the *ex ante* incentive-to-invent theory of patent law.)

124. See NARD, *supra* note 123, at 29; Kenneth W. Dam, *The Economic Underpinnings of Patent Law*, 23 J. LEGAL STUD. 247, 247 (1994) (noting that it is important to recognize the primary problem that the patent system solves: “This problem, often called the ‘appropriability problem,’ is that, if a firm could not recover the costs of invention because the resulting information were available to all, then we could expect a much lower and indeed suboptimal level of innovation.”).

B. MINIMIZING WASTEFUL PATENT RACES

Yoram Barzel recognized that patent rights should be awarded earlier rather than later to avoid wasteful races to invent.¹²⁵ Barzel observed that the act of inventing a particular technology was a common resource susceptible to the “common pool” problem causing multiple firms to engage in inefficient races to invent that dissipate all of the invention’s “special economic value.”¹²⁶ While Barzel’s suggested solution was patent auctions,¹²⁷ Kitch built upon Barzel’s observations and offered the Prospect Theory as an explanation of how the patent system, by pushing inventors to file early, solved the wasteful patent race problem.¹²⁸ The prospect aspect of the patent system—awarding broad patent rights early in development—reduced socially wasteful patent races by shortening them.¹²⁹ The earlier patent law ends the race between multiple researchers seeking to invent the same technology, the fewer resources are then devoted to a duplicative effort.¹³⁰ And, as previously mentioned, the prospect nature of the patent system also reduces wasteful postpatenting races by allowing the patent holder to coordinate the commercialization and improvement of the invention.¹³¹

Yet several scholars question early filing’s ability to reduce the waste created by patent races. Donald McFetridge and Douglas Smith wrote a reply to Kitch’s Prospect Theory article in which they accepted the postpatenting benefits of patent exclusivity but concluded that such gains would only intensify the early race to patent.¹³² McFetridge and Smith argued that while the race may end earlier under the prospect view of the patent, the race still exists at the early stage of development and is more intense because that much more is at stake.¹³³ Waste is not eliminated, but simply produced over a shorter, earlier period under the patent system’s early filing rules.¹³⁴ Such early, intense competition then dissipates all of the rents from the invention at the conception stage.¹³⁵ Duffy recently echoed McFetridge and Smith’s concerns, seconding that “by increasing efficiency of post-patent investments in developing the

125. Yoram Barzel, *Optimal Timing of Innovations*, 50 REV. ECON. & STAT. 348, 352 n.11 (1968).

126. *Id.* at 349.

127. *Id.* at 353 n.11.

128. Kitch, *supra* note 12, at 269–70.

129. *Id.* at 276–79.

130. *Id.* at 265–66.

131. *Id.* at 278–79.

132. Donald G. McFetridge & Douglas A. Smith, *Patents, Prospects and Economic Surplus: A Comment*, 23 J.L. & ECON. 197, 198 (1980).

133. *Id.* at 198–201.

134. *See id.* at 198.

135. *Id.* at 203; Mark F. Grady & Jay I. Alexander, *Patent Law and Rent Dissipation*, 78 VA. L. REV. 305, 316–17 (1992).

technology, the prospect features of the patent system will merely shift rent-dissipating patent races backward in time.”¹³⁶

Others respond that such races are not necessarily wasteful.¹³⁷ Early races to invent are not inevitably duplicative. Two companies may be attempting to solve a given problem and, at the end of the race, produce two viable solutions.¹³⁸ These alternatives can be, on net, socially beneficial because their presence may reduce the price of the inventions produced and provide consumers with a greater selection of products.¹³⁹ Such races can also have unrelated positive spillover effects.¹⁴⁰ A company who loses the race may, in the process of inventing, make an unintended discovery that solves another societal problem or assists in the development of that company’s next invention.¹⁴¹

Given the strengths of the critiques, both with respect to whether early filing actually reduces wasteful patent races and whether races are truly wasteful, the benefits of early filing associated with patent races are questionable. However, recognition of the interplay between filing timing and patent races is necessary when evaluating the timing of patent filing. The timing of filing definitely has an effect, at least in some cases, on the length of the race to invent and, in turn, the benefits and drawbacks of patent races discussed above then become relevant.

C. CAUSING EARLIER DEDICATION TO THE PUBLIC

Even if the early filing nature of the patent system does not reduce wasteful patent races, an earlier finish line may still be beneficial. Duffy reframed the critique of the Prospect Theory as a question of “not *whether* rents will be dissipated, but *how* they will be dissipated.”¹⁴² Duffy

136. Duffy, *supra* note 15, at 443.

137. See R. Polk Wagner, *Information Wants To Be Free: Intellectual Property and the Mythologies of Control*, 103 COLUM. L. REV. 995, 1001 n.19 (2003) (“There is a rich literature (dealing principally with patents) suggesting that an analogous tragedy may result from, for example, patent races—where multiple parties ‘race’ to create a patentable invention, thereby reducing or eliminating the benefits of the advance through unnecessarily redundant effort.”); Suzanne Scotchmer, *Incentives to Innovate*, in THE NEW PALGRAVE DICTIONARY OF ECONOMICS AND THE LAW 273, 275 (Peter Newman ed., 1998) (“The literature has produced two views of patent races: that they inefficiently duplicate costs, and that they efficiently encourage higher aggregate investment.”).

138. See JEAN TIROLE, THE THEORY OF INDUSTRIAL ORGANIZATION 400 (1988) (indicating that a patent race loser may develop another, beneficial product); Grady & Alexander, *supra* note 135, at 316–21.

139. See TIROLE, *supra* note 138; Grady & Alexander, *supra* note 135, at 316–21.

140. Giovanni De Fraja, *Strategic Spillovers in Patent Races*, 11 INT’L J. INDUS. ORG. 139, 140 (1993); Jennifer F. Reinganum, *A Dynamic Game of R and D: Patent Protection and Competitive Behavior*, 50 ECONOMETRICA 671, 671 (1982).

141. *Supra* note 140.

142. Duffy, *supra* note 15, at 443, 475–80 (analogizing early patenting to a Demsetzian auction—a government-run auction where each franchise can bid in terms of price and quality of service for exclusive access to consumers).

observed that early filing means early expiration—putting the patented technology in the public domain earlier.¹⁴³ And since earlier filing means that patent protection begins before commercialization occurs, the patentholder has less time to exploit the patented technology, “diminish[ing] the patentee’s rents.”¹⁴⁴ The patent system, by encouraging early filing, places the invention into the public domain sooner.¹⁴⁵ Society gets to enjoy the benefits of the invention sooner, without the costs of exclusive control.

Michael Abramowicz critiqued Duffy’s theory, acknowledging that the patent expires sooner but observing that this fact raises another concern: underdevelopment of the patented technology.¹⁴⁶ The earlier in the development process an inventor files for patent protection, the more uncertain and, in turn, unlikely it is that the inventor will actually commercialize the invention.¹⁴⁷ Patent protection, by definition, gives the patent holder the favorable option of delaying commercialization until such an action is clearly beneficial to the patent holder.¹⁴⁸ This creates the possibility that the patent holder will never exercise the commercialization option during the patent period, instead waiting for such an option exercise to become more favorable.¹⁴⁹ This lack of commercialization gets the invention into the public domain quicker, but makes it more likely the technology is never fully developed.¹⁵⁰ Abramowicz argued that, on net, a pure prospect system with early filing and fixed patent terms creates the real possibility of underdevelopment of the patented invention.¹⁵¹

III. COSTS OF AN EARLY FILING DOCTRINE

While there has been discussion about the merits of an early-filing patent system, the discussion has been mostly one-sided, with no one fully exploring the costs of an early-filing system. In particular, no one has examined the lack of information and great uncertainty surrounding the invention at the time of early filing. Nor has there been a discussion of the effect this lack of information and uncertainty has on which patent applications are filed, how many are filed, and the use of such applications once they issue as patents.

143. *Id.* at 444.

144. *Id.*

145. *Id.* at 468.

146. Abramowicz, *supra* note 14, at 1079.

147. *Id.*

148. *Id.* at 1079–80.

149. *See id.*

150. *See id.*

151. *Id.* at 1081–82.

This Part fills these holes in the discourse. It begins with a description of the technological development process. There is an enormous amount of technical and market information generated as development proceeds towards the final goal of commercial sale. And the amount of information grows as development progresses. Accordingly, the earlier in the development process a patent is filed, the less available information there will be about the invention and, more importantly, how the invention will be used commercially. This lack of information at the time of early filing leads to uncertainty about the invention's worth. When compared to the low costs of patenting and the high, yet probabilistic, potential value of patent protection, inventors err on the side of filing a patent application on the invention at this early stage of development. Then, in reaction to the additional information that becomes available after early filing, inventors file for additional patent protection by using mechanisms such as continuations, continuations-in-part, and new applications. All of this leads to overfiling by the inventor to compensate for the lack of invention information at the early stage of development and to capture the new information encountered at later stages. This combination—early filing with little information and follow-up filing to capture new information—exacerbates the patent system's most recognized problems. It decreases the quality of patent examination, leads to the underdevelopment of patented technologies, promotes patent trolls, and creates unclear patent boundaries.

A. EARLY PATENT FILING IN THE CONTEXT OF TECHNOLOGICAL DEVELOPMENT

The filing of a patent application does not occur in a vacuum. It is typically the offshoot of a technology development process.¹⁵² A certain amount of development occurs prior to the filing of the patent application and then, presumably, development continues after filing.¹⁵³ Even if the inventor chooses to discontinue development after filing, time marches on, producing more information about the technologies that affect the invention and the potential market for the invention.

The question is: where does early filing place the decision to patent in the process of technological development? To define this time period, this Part utilizes two concepts. First, the typical new technology development process is described. Then, the level of technical and market knowledge required by patent law prior to filing is used to

152. See M. HENRY HEINES, PATENTS FOR BUSINESS 1–8 (2007).

153. Development post-patenting is not a given, particularly if the patent is filed early. See *infra* Part III.C.2.

identify the point in time where the filing decision occurs during the technological development. As a result, the amount of information known and not known at filing becomes readily ascertainable.

I. Development Process

Development processes vary amongst companies in a given industry and vary even more between industries.¹⁵⁴ Development processes also vary in relation to the sophistication and resources of the company or individual engaged in new technological development.¹⁵⁵ There are, however, commonalities in such processes.¹⁵⁶ The process of development usually occurs in loosely defined stages, starting with an initial “idea” stage and ending with the commercial launch of a specific product or service.¹⁵⁷ The goal is that each stage generates more technical and market information about a potential product configuration, so that decisions can be made as to which product configurations to continue developing and which to abandon because of discovered technical and/or market issues.¹⁵⁸ The process, hopefully, results in a commercialized product that is technologically feasible and best meets market demand.¹⁵⁹

The ideas for product configurations that begin most technology development processes are usually very general.¹⁶⁰ The product ideas may be in response to a market demand—ideas for “market-pull” products.¹⁶¹ For example, there may be a recognized market need for a smaller cell phone or a cure for a particular form of cancer and a company might try

154. See Burk & Lemley, *supra* note 54, at 1581–89 (noting the diverse nature of innovation across technological industries).

155. For example, some companies are very structured in their development processes, using formalistic development processes such as the traditional STAGE-GATE or PACE process. See, e.g., Greg M. Ajamian & Peter A. Koen, *Technology Stage-Gate: A Structured Process for Managing High-Risk New Technology Projects*, in THE PDMA TOOLBOOK FOR NEW PRODUCT DEVELOPMENT 267 (Paul Belliveau et al. eds., 2002).

156. See ROBERT G. COOPER, WINNING AT NEW PRODUCTS 35–37 (1986) (reporting on the “number of underlying themes and recurring messages” that emerge from studying multiple companies’ new-technology development experiences).

157. See MERLE CRAWFORD & ANTHONY DI BENEDETTO, NEW PRODUCTS MANAGEMENT 26–33 (8th ed. 2006) (describing the “phases” of new product development); Robert G. Cooper, *A Process Model for Industrial New Product Development*, IEEE TRANSACTIONS ON ENGINEERING MGMT., Feb. 1983, at 2, 2–11 (articulating a seven stage development process).

158. See COOPER, *supra* note 156, at 49–63 (describing both the technical and market information generated at each stage of the development process). The term “product configuration” is used loosely to label a technical variation of a product or service that is the part of a new-technology development process.

159. See CRAWFORD & DI BENEDETTO, *supra* note 157, at 33 (noting that the process is really “an evolving product, or better, an evolving concept that, at the end, if it is successful, becomes a product” (emphasis omitted)).

160. See COOPER, *supra* note 156, at 49 (describing the idea “stage” of development).

161. *Id.* (noting that “market-pull ideas” are “generated by the marketplace—a competitor’s new product, recognition of unsatisfied customers’ needs, or direct requests from customers”).

to respond by developing a new product. The ideas may also be prompted by a new, but not-yet-applied technology—ideas for “technology-push” products.¹⁶² A new water-resistant material may be discovered and development’s focus is finding a product that could use this new technology to meet a consumer demand. From this initial product-idea brainstorming, a set of possible product configurations are selected that have potential and then a preliminary assessment is made of each of them.¹⁶³ This evaluation continues, with each stage yielding more information about the initial product ideas and flushing out particulars in response to each wave of investigation.¹⁶⁴ This progression of development seeks to generate and then apply two types of information—technical and market information.¹⁶⁵

a. Technical Information Generated

A potential product’s technological feasibility is the main focus of the technical side of development.¹⁶⁶ A product’s initial technical make-up is defined and then, in order to achieve the required consistency and adequateness in the product’s operation, more technical information about how the product works is generated.¹⁶⁷ The product’s technical feasibility is eventually explored through experimentation, prototyping, and other real-world feasibility testing.¹⁶⁸ Throughout this process, the actual technical specification of the product constantly changes in response to success, or failure, of certain technical configurations.¹⁶⁹

Questions of technical feasibility also include how to produce and distribute the product efficiently. In order to make commercialization worthwhile, a product is usually modified technically to maximize the use of production and distribution methods.¹⁷⁰ Issues concerning the

162. *Id.* (identifying “technology-push ideas” as those “generated by research or a serendipitous discovery”).

163. *Id.* at 55–57 (“Preliminary assessment is the first stage at which significant resources are spent to gather information regarding the feasibility of a project.”).

164. These later “stages” of development can include a concept definition stage, a development stage, a testing stage, and a trial stage. *Id.* at 57–63.

165. *Id.*

166. See Emmett W. Eldred & Michael E. McGrath, *Commercializing New Technology-I*, RES.-TECH. MGMT., Jan–Feb. 1997, at 41, 42–44 (discussing the targeted technology feasibility point (TFP) for new technology development). Technical uncertainty is usually very high at the beginning of any new technology development. *Id.* at 42.

167. *Id.* at 42–44.

168. See TOM KELLY, *THE ART OF INNOVATION* 103–06 (2001) (emphasizing that “doing”—such as building prototypes—is crucial to fully developing innovations); STEFAN H. THOMKE, *EXPERIMENTATION MATTERS* 23–25 (2003) (noting how experimentation generates technical information and reduces technical uncertainty); Cooper, *supra* note 157, at 2–11 (describing the later stages of product development, including the development, testing, and trial stages, all of which take a concept and use tools such as prototyping to generate more technical information about a potential new product).

169. Cooper, *supra* note 157, at 2–11.

170. See THOMKE, *supra* note 168, at 25 (discussing the uncertainty in achieving large, cost-effective

integration of the product into larger products or processes are also answered during development.¹⁷¹ A product may also need to work well with complementary technologies. Such integration or companion use requires further definition of the technical construction of the product.¹⁷²

There is also a feedback between market information and technical information regarding the product during development. As the market becomes better known and defined, technical changes occur.¹⁷³ The product's configuration changes to better meet customer demand by either providing preferred functionality or getting production costs to a desired price point.¹⁷⁴

b. Market Information Generated

Usually in parallel with the technical development of a product, the market for the product is explored.¹⁷⁵ Market analysis may start with small, targeted studies—both to better define the potential markets and to get feedback on the current technical version of the product.¹⁷⁶ As development continues and the product becomes more defined, the market studies become more elaborate and occur on a wider scale.¹⁷⁷ The target market becomes better defined.¹⁷⁸ Possible competitors and market position become clearly identified.¹⁷⁹

The feedback between market and technical information also occurs, this time with newly acquired technical information producing additional market information. Better understanding of what is technically feasible and the likely price and delivery date shapes the

production of a new technology).

171. See CLIVE L. DYM & PATRICK LITTLE, *ENGINEERING DESIGN: A PROJECT-BASED INTRODUCTION* 92 (2d ed. 2004) (identifying the need to define “interface performance specifications” and ensure they are met).

172. See *id.* (noting that interfacing technologies with other systems is “extremely hard in practice,” and thus it is helpful to get as much information about how the various technologies interact).

173. See COOPER, *supra* note 156, at 58–62 (describing how market studies and consumer testing influence the “design requirements for what constitutes a better product”).

174. See *id.*

175. See Michael Abramowicz & John F. Duffy, *Intellectual Property for Market Experimentation*, 83 N.Y.U. L. REV. 337, 342–43 (2008) (describing the field of market experimentation and arguing there should be some intellectual property protection for activities).

176. See COOPER, *supra* note 156, at 54–57 (suggesting such quick initial marketing analysis as a targeted phone survey).

177. *Id.* at 57–63 (including in such larger scale market testing a pilot production run where the product is made and sold in a test market).

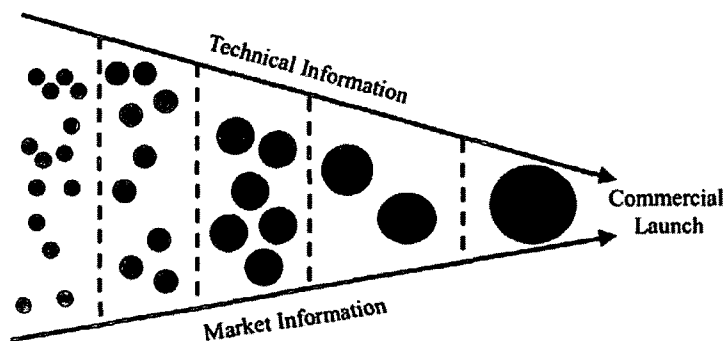
178. See *id.*

179. See, e.g., CHARLES W. LAMB, JR. ET AL., *MARKETING* 337–38 (8th ed. 2006); JAMES M. MORGAN & JEFFREY K. LIKER, *THE TOYOTA PRODUCT DEVELOPMENT SYSTEM* 125–31 (2006) (documenting the development of the Toyota Prius); Cooper, *supra* note 157, at 8 (describing the “Preliminary market assessment” stage of development where information is collected on market size and market segments).

market for the potential product.¹⁸⁰ This technical information influences what the target market is, the level of demand, and the resulting profit.¹⁸¹ The same effect occurs with technical information about other products which the product in development is going to be integrated with or is complementary to.¹⁸² As the technical composition of these external products changes, so too does the market for the product being developed.¹⁸³ For example, if it turns out the product is not as technically compatible with a complementary technology, that lack of technical fit narrows the market for the product. Finally, the availability of a prototype helps generate market information—giving something for focus groups to put their hands on and provide feedback as to their likes and dislikes of a given product configuration.¹⁸⁴

The development process and, in particular, the progressively increasing amount of technical and market information, is depicted graphically below in Figure 1.¹⁸⁵

FIGURE 1: DEVELOPMENT PROCESS



180. See Robert G. Cooper & Elko J. Kleinschmidt, *An Investigation into the New Product Process: Steps, Deficiencies, and Impact*, 3 J. PRODUCT INNOVATION MGMT. 71, 73-76 (1986) (observing that in over 250 new product launches, seventy-five percent included an initial market assessment and twenty-five percent included a detailed marketing study).

181. See LAMB, *supra* note 179, at 339-40; Cooper, *supra* note 157, at 9 (discussing the end of the concept stage of development, where market studies are done to "gauge . . . market acceptance of the new product: interest, liking, preference, and intent to purchase").

182. See CRAWFORD & DI BENEDETTO, *supra* note 157, at 71-72 (discussing how "technology familiarity" with "existing platforms" influences new product design).

183. See LAMB ET AL., *supra* note 179, at 347 (mentioning compatibility of a new product as one of five influencing factors on the product's market).

184. See KELLY, *supra* note 168, at 103-06.

185. See COOPER, *supra* note 156, at 54-57; Cooper, *supra* note 157, at 9 (describing the use of a prototype to do consumer market testing).

The technical and market information, shown in Figure 1, increases as the development proceeds towards the goal of the commercial launch of the product. The dotted lines delineate the stages of development. In each stage, starting with an idea stage and ending in commercialization, the number of dots—the potential product configurations—decreases as certain configurations become identified as not being commercially viable. The dots that do make it to the next stage grow bigger because more information is known about that particular product's configurations. This growth in technical and market information is represented graphically as a dot larger than the previous stage's dot.

2. *Lack of Information at the Time of Early Filing*

Viewed in the context of the technological development process, the lack of technical and market information at the time of early filing becomes apparent. The standards for patentability require very little technical information prior to filing and essentially no market information. And, as previously discussed, patent law incentivizes inventors to file shortly after these standards are met, meaning that filing occurs with little invention information.¹⁸⁶

Patent law requires only a concrete and specific conceptualization of the invention prior to filing.¹⁸⁷ To be sure, the invention must be more than just an idea.¹⁸⁸ And an inventor must communicate enough specific information in the patent application to enable others to build and operate the invention without undue experimentation.¹⁸⁹ There is also a base requirement that the invention be essentially operable.¹⁹⁰ But patent law does not require an actual, working embodiment.¹⁹¹ Patent law also explicitly assumes the need for more experimentation after filing to actually implement the invention.¹⁹² This means that when patenting becomes an option, only a minimal amount of technical feasibility work must be done.¹⁹³

Furthermore, patent law explicitly does not require “a perfected, commercially viable embodiment.”¹⁹⁴ The invention does not need to be in commercial form.¹⁹⁵ It does not need to operate at the level of

186. *See supra* Part I.A.1.

187. *See supra* Part I.A.1.

188. *See supra* Part I.A.1.

189. *See supra* Part I.A.1.

190. *See supra* Part I.A.2.

191. *See supra* Part I.A.1.

192. The experimentation must simply not be undue. *See Impax Labs., Inc. v. Aventis Pharms., Inc.*, 545 F.3d 1312, 1314–15 (Fed. Cir. 2008).

193. Kitch, *supra* note 12, at 270–71.

194. *CFMT, Inc. v. Yieldup Int'l Corp.*, 349 F.3d 1333, 1338 (Fed. Cir. 2003).

195. *See supra* Part I.A.1.

consistency demanded by commercial use.¹⁹⁶ This low requirement plays out in practice. "In general, few patented inventions are an immediate commercial success. Rather, most inventions require further development to achieve commercial success."¹⁹⁷ Certainly this is not the case for all inventions at the time of filing.¹⁹⁸ But most patenting occurs at the precommercialization stage.

The patent rules require even less market information prior to filing. In fact, knowledge of the potential market is not required prior to filing.¹⁹⁹ The utility requirement does not judge the commercial viability of the invention, even for those technology areas that are subjected to a heightened requirement.²⁰⁰ Most likely, the inventor has a general idea of the need for the particular solution to which the invention is directed. However, if the invention is a technology-push invention, as opposed to market-pull, the inventor may lack even this minimal market information and have the sole goal of creating a new technology.²⁰¹

This means that at the time of early filing, the inventor does not necessarily have any understanding of the market for the invention. The inventor does not know what the possible cash flow is from commercializing the invention.²⁰² There is little to no information about the composition of the market, the demand in the market, the particular features wanted by the market, or the price sensitivity of the market.²⁰³ Essentially, at the time of early filing, there is little information about the exact specifications the market wants and how profitable it would be to offer such an invention.

Accordingly, if early filing is placed in the context of Figure 1 above, early filing would take place at one of the initial, early stages of development (located in the left portion of the Figure 1). Filing decisions would be made when the potential product configurations (inventions) are numerous and undeveloped. That is, early filing occurs in stages with a high number of small dots.

Possible exceptions to the general lack of technical and market information at the time of early filing are those inventions for which patent law requires more technical information. Such areas are chemistry

196. See *supra* Part I.A.1.

197. *CFMT*, 349 F.3d at 1340.

198. Even Kitch admits that "[m]any inventions, including many important ones, are patented in a commercially significant form." See Kitch, *supra* note 12, at 271.

199. *Id.* at 270-71.

200. As Kitch puts it, all that is required is an invention "that works." See *id.* at 270-71.

201. See, e.g., COOPER, *supra* note 156, at 49 (defining the difference between technology-push and market-pull ideas).

202. Eduardo S. Schwartz, *Patents and R&D as Real Options*, 33 *ECON. NOTES* 23, 24 (2004) (identifying estimated cash flow as one of the uncertainties at the time of patenting).

203. See CRAWFORD & DI BENEDETTO, *supra* note 157, at 30-34.

and biology, where patent law applies heightened enablement and utility requirements.²⁰⁴ This means that applications filed on inventions in these areas are further along in development when patenting is sought. More technical information is required—evidence of actual use of the invention and a definitive end-use application.²⁰⁵ And, even if the law does not require market information for chemical or biological inventions,²⁰⁶ some market information is likely generated prior to filing because such information is typically produced in parallel with technical development.²⁰⁷ So, just as there is more technical information on chemical and biological invention prior to filing, there is also likely more market information prior to filing.

3. Resulting Uncertainty

This lack of technical and market information at early filing generates uncertainty about the future value of the invention and, in turn, the value of the patent-holder's right of exclusivity.²⁰⁸ There is technical uncertainty—unknowns about the invention's true technical viability, the cost and timing of production, and, ultimately, its technical composition come launch date. There is even more market uncertainty—unknowns regarding market composition, demand, price tolerances, and ultimate profitability of commercializing the invention.

This uncertainty means that the earlier an inventor files, the wider the range of possibilities of the future value of the invention. Referring

204. See Janice M. Mueller, *The Evolving Application of the Written Description Requirement to Biotechnological Inventions*, 13 BERKELEY TECH. L.J. 615, 617 (1998); Arti K. Rai, *Intellectual Property Rights in Biotechnology: Addressing New Technology*, 34 WAKE FOREST L. REV. 827, 834–35 (1999); Margaret Sampson, Comment, *The Evolution of the Enablement and Written Description Requirements Under 35 U.S.C. § 112 in the Area of Biotechnology*, 15 BERKELEY TECH. L.J. 1233, 1262 (2000).

205. Burk & Lemley, *supra* note 54, at 1644–45.

206. See Duffy, *supra* note 15, at 453 n.53 (giving examples of where the utility requirement could be met for a biotechnology invention, even if the invention has no commercial value).

207. See COOPER, *supra* note 156, at 50–63. That is, as they obtain more technical information about the new technology, they also get more market information. Marketing information is generated while proceeding technically for a very practical reason—companies who are making decisions to spend more resources to nail down the technical attributes of a given product want to make sure that each additional dollar spent is worthwhile.

208. Abramowicz, *supra* note 14, at 1075 (“Someone who owns a patent cannot be sure how profitable commercialization of the patent will be or even how much it will cost to complete the commercialization process.”). Abramowicz makes this observation based on Shaun Martin and Frank Partnoy’s “Patents as Options” theory. *Id.* at 1073 n.23 (citing Shaun Martin & Frank Partnoy, *Patents as Options*, Videotape Presentation at the Washington University School of Law Conference on Commercializing Innovation (Nov. 4, 2005), available at <http://law.wustl.edu/CRIE/index.asp?id=1737>). Martin and Partnoy analogize patent rights to real options, particularly a call option—the ability to decide at a future date to exercise the patent exclusivity option by commercializing the claimed invention or asserting the exclusivity right via litigation. *Id.* at 1073–74. The Author has expanded on this analogy. See Christopher A. Cotropia, *Describing Patents as Real Options*, 34 J. CORP. L. 1127 (2009).

back to Figure 1, each dot represents a potential product configuration, and thus a potential invention, upon which a patent may be filed. At the beginning of the development process, the lack of information makes it difficult to know whether a particular invention—a specific dot—will be the one that eventually becomes commercialized. That is, whether the invention has commercial value and, in turn, whether exclusivity over that invention—the patent—will have value.²⁰⁹ As time goes on—and development continues—more technical and market information is generated. This additional information reduces the uncertainty because nonviable inventions are abandoned and those inventions that remain are closer to commercialization, and thus their worth becomes clearer.²¹⁰ This increase in certainty with the passage of time even occurs if the inventor stops developing. This is because invention information can come from external sources, such as technical changes of a complementary technology or production process or market changes due to variations in consumer demand for the invention's technological area.

B. COMPENSATION FOR LACK OF INFORMATION AND UNCERTAINTY BY OVERFILING

The lack of information and great uncertainty at the early filing stage leads to more patent applications. Given the circumstances at such an early stage in the development cycle, inventors choose to err on the side of filing patent applications for most inventions. This early in development, there is uncertainty as to the possible upside of a given invention. But failure to file early likely prohibits the inventor from ever enjoying this, albeit probabilistic, upside. And the potential upside to filing is compared against a small and fixed downside—the costs of filing (attorney and filing fees), which most likely pale in comparison with the potential value of patent exclusivity.

After deciding to file early, patent applicants continue to use the patent system as the development process continues and new invention information comes to light. Applicants file continuation applications to claim different aspects of their invention that new information has identified as commercially valuable.²¹¹ Applicants also file new applications, or continuations-in-part, as the invention evolves to include technical aspects not originally disclosed in the earlier-filed application.²¹² The patent rules, lack of information, and uncertainty prompt inventors

209. See *infra* Part III.C.3 for a discussion of another patent value that is independent of commercialization—assertion against other companies.

210. Abramowicz, *supra* note 14, at 1075–76 (“The future, however, tends to become clearer as we move toward it.”).

211. See *infra* Part III.B.2.a.

212. See *infra* Part III.B.2.b.

to “file early.”²¹³ The additional information that is generated as time continues creates an accompanying “file often” mentality.²¹⁴

1. Early Decision Window Prompts Inventors to Err on the Side of Filing

When an inventor reaches conception, the inventor is faced with a choice. Either file for a patent with the little technical and market information available or wait while more information becomes available and the value of a patent right becomes more certain. The patent rules make it risky to wait, with each additional day increasing the risk that the inventor loses the right to her invention.²¹⁵ If she loses her patent rights because of delaying filing, they are lost forever, and she possibly becomes subservient to another’s patent rights.²¹⁶

Add to these circumstances the fact that an inventor is unlikely to know if others are close to inventing the same subject matter upon which she is working. Those researching in a given field are sometimes aware of similar researchers doing similar things.²¹⁷ But the specific act of filing a patent application is secret.²¹⁸ An inventor does not know if someone else has filed an application until—at the earliest—eighteen months after the filing date when the application is published.²¹⁹ Such a discovery occurs only if the inventor is actively looking.²²⁰ And a discovery at this stage is, in most cases, made too late for the inventor to take corrective action.²²¹ The silence as to others’ patenting activities can extend another year if a provisional application was filed and could be until the application issues if the earlier applicant elects not to publish.²²² The lack of knowledge also extends to other acts that may bar the inventor’s patent rights, such as an offer for sale or publication by another that occurs after the date of conception but more than one year before an application is filed.²²³

The inventor, when making an early filing decision, not only knows little about others’ filing activities but also knows little about the commercial value of the exclusivity a patent would provide.²²⁴ As

213. See *infra* Part II.B.2.

214. See *infra* Part II.B.2.

215. Kitch, *supra* note 12, at 270 (“[I]t is risky not to immediately seek a patent . . .”).

216. MERGES & DUFFY, *supra* note 83, at 541 (“[W]hile being the first to invent creates a right to a patent, the statutory bars can destroy the right if the inventor waits too long to file an application.”).

217. See Duffy, *supra* note 15, at 462–63 (providing the example of multiple people racing to invent the telegraph).

218. 35 U.S.C. § 122(a) (2006).

219. *Id.* § 122(b).

220. See Mark Lemley, *Ignoring Patents*, 2008 MICH. ST. L. REV. 19, 21–22.

221. See, e.g., 35 U.S.C. § 102(a)–(b).

222. *Id.* § 122(b)(2).

223. Kitch, *supra* note 12, at 270 (“Since the commercial use or publication [that creates a statutory bar] may be by others, the bar is not within the inventor’s control.”).

224. See *id.* (noting that at the early filing stage, the “practical significance of the innovation may

discussed earlier, little information regarding the invention, particularly market information, is required at the early filing stage.²²⁵ This lack of information makes the projected value of a patent incredibly uncertain. At this early stage of development the value falls within a wide range, with a defined floor being the cost of obtaining the patent and an almost unlimited ceiling of the best expected profits from the exclusive sale of the patented technology.

Faced with a choice to file early or wait, most inventors err on the side of filing. This is the commonly accepted professional advice given to patent practitioners.²²⁶ The reasons behind such advice, and therefore why most follow it, are four-fold.

First, the patent's ability to facilitate commercialization in the future becomes more valuable the further out the time of filing is from possible commercialization.²²⁷ There is value in having the option to exercise patent exclusivity in light of this uncertainty. That is, the patent leaves its owner the option to exercise exclusivity at any time during its period of exclusivity—if the invention's commercial value becomes clearer, the patent is there to help make the invention profitable.²²⁸ Abramowicz explains that “[u]ncertainty . . . makes it apparent that patents are options, and so long as there is some chance that the option will be worth exercising, an inventor may have an incentive to seek a patent.”²²⁹

Second, the earlier the patent right's value is examined, the greater the range of its value.²³⁰ So, early in development, the possible upside is larger, which entices more inventors to file. “[A]n inventor will sometimes be willing to enter a patent race very early because of the possibility that an invention will be more valuable than expected.”²³¹ Professor Dennis Crouch describes a patent “lottery” effect, identifying the large upside of the patent right, no matter how unlikely, as the incentive to file for patent protection.²³² This lottery effect plays a role in

be but dimly perceived”); *supra* Part III.A.3.

225. See *supra* Part I.A.1.

226. See, e.g., JEFFREY G. SHELDON, *HOW TO WRITE A PATENT APPLICATION* § 1.5 (2009) (“There are some reasons for delay in filing. It is unusual that these reasons will overcome the aforementioned reasons for filing promptly.”).

227. See NARD, *supra* note 123, at 30–31.

228. See Cotropia, *supra* note 208, at 1137 (“This exclusive use of the invention allows the patentholder to commercialize the invention and sell it at a supra-competitive price.”).

229. Abramowicz, *supra* note 14, at 1079.

230. See William Johnson, *Managing Uncertainty in Innovation: The Applicability of Both Real Options and Path Dependency Theory*, 16 *CREATIVITY & INNOVATION MGMT.* 274, 276 (“The further away an opportunity is in time, the greater the options value on it will be, but the less the resources applied to manage it.”).

231. Abramowicz, *supra* note 14, at 1079.

232. See Dennis D. Crouch, *The Patent Lottery: Exploiting Behavioral Economics for the Common Good*, 16 *GEORGE MASON L. REV.* 141, 142 (2008).

erring on the side of filing—the inventor is focused on the upside, which is by definition larger the earlier one files.²³³

Third, the cost of filing—the downside of seeking protection—is low compared to the potential value of the patent right. The filing fees are small, starting at \$330.00.²³⁴ The fees even adjust based on the size of the inventor.²³⁵ The attorney fees are fairly low as well, with the cost for preparing the patent application being, on average, \$9412.²³⁶ The burden of these initial costs can be spread out over a year through the use of a provisional application, which entails initial fees that are even lower than a nonprovisional application.²³⁷ With the usual delays in USPTO examination, the inventor typically has almost two years to gather more information on the invention's worth before outlaying more resources to continue her pursuit of a patent application.²³⁸ This ability to spread out the costs of filing between a provisional application, non-provisional application, and the different stages of prosecution lowers the cost of filing to an inventor and allows the inventor to defer portions of the costs until a time at which the invention's worth is more certain. There is also the benefit that this downside is fairly certain and fixed. The inventor knows, at the beginning, what the costs of patenting will be.

Moreover, either by not electing publication or abandoning within eighteen months of filing, the inventor does not forgo the option of keeping her invention secret, making the costs of filing even lower.²³⁹ There is some risk in revealing technical information by filing and losing trade secret protection.²⁴⁰ This risk, however, can be managed by not electing early publication and by abandoning a patent application before issuance.²⁴¹

233. Abramowicz, *supra* note 14, at 1079.

234. 37 C.F.R. § 1.16(a)(1) (2008).

235. Small entity filing fee is \$165.00. *See id.*

236. *See* AIPLA REPORT, *supra* note 74, at I-79 (noting the average cost for a relatively complex mechanical invention). The cost decreases as the technical complexity decreases. *See id.* at I-78 (reporting the average cost for a minimally complex application to be \$7012).

237. The filing fee for a provisional application is \$220.00, *see* 37 C.F.R. § 1.16(d), and the cost of preparation is about half that of a utility—\$4384. *see* AIPLA REPORT, *supra* note 74.

238. The current average pendency before the first office action is 22.6 months. *See* U.S. PATENT & TRADEMARK OFFICE, PERFORMANCE AND ACCOUNTABILITY REPORT FISCAL YEAR 2006, at 21 (2007), available at http://www.uspto.gov/web/offices/com/annual/2006/50304_table4.html.

239. *See* 35 U.S.C. § 122 (2006).

240. *See* *Universal Oil Prods. v. Globe Oil & Refin. Co.*, 322 U.S. 471, 484 (1944) (“As a reward for inventions and to encourage their disclosure, the United States offers a seventeen-year monopoly to an inventor who refrains from keeping his invention a trade secret.”).

241. Robert M. M. Seto, *A Federal Judge's View of the Most Important Change in Patent Law in Half-a-Century*, 11 J. TECH. L. & POL'Y 141, 163 (2006) (“For example, if early prosecution suggests that a patent is too hard to obtain from the patent office, the applicant may opt to abandon the patent application, and because the application is still secret, he can retain the trade secret and protect it from discovery as a trade secret.”).

There is even a potential upside to disclosing the invention absent patent protection. Publication via the USPTO can negate others' potential patent rights.²⁴² Hidden information usually does not qualify as prior art and, therefore, cannot be used to invalidate another's patent.²⁴³ Filing solves this problem by facilitating publication that, even if it does not result in a patent, makes the invention public and clears the way for its inventor by negating other's potential patent rights.²⁴⁴ An application that is published and then abandoned still operates to bar others from obtaining exclusivity over the same subject matter.²⁴⁵

Fourth, there is value in having a patent even if the holder never commercializes the claimed technology or attempts to assert the patent. Patents can be used as currency when dealing with other companies. Patents are typically used as "barter" in licensing discussions, with the patent providing an alternative to royalty payments to gain a license to some other intellectual property in return.²⁴⁶ Patents can also provide a good defense against others asserting intellectual property. Patenting in certain industries is viewed as a means to create and maintain a mutually assured destruction arrangement.²⁴⁷ It is not uncommon for all of the players in a given industry to amass patent rights in order to maintain a position where if one company asserts its patents against another, there will be an equal volley of patents in return.²⁴⁸ Patents are also sold or even donated for tax-write-off purposes.²⁴⁹

Patents also have value in numbers. Gideon Parchomovsky and Polk Wagner recently documented the fact that patenting sometimes occurs not because of the individual patent's worth, but because of the value of the patent in combination with other patents.²⁵⁰ The mere fact a patent is in a given technical area—even if the patent claims a technology that is not of much value by itself—helps strengthen other patents held in

242. See, e.g., 35 U.S.C. § 102(a).

243. Cf. *id.* § 102(g).

244. See Gideon Parchomovsky, *Publish or Perish*, 98 MICH. L. REV. 926, 928 (2000) ("From a practical standpoint, the strategy of preemptive publication is made possible by the lag that exists between the time a firm obtains sufficient research results to effect a change in the prior art and the time it perfects the invention.").

245. See 35 U.S.C. § 102(e).

246. Ronald J. Mann, *Do Patents Facilitate Financing in the Software Industry?*, 83 TEX. L. REV. 961, 990 (2005).

247. *Id.* at 990–91; Parchomovsky & Wagner, *supra* note 8, at 26–27 (describing defensive patenting strategy); see Bronwyn H. Hall & Rosemarie Ham Ziedonis, *The Patent Paradox Revisited: An Empirical Study of Patenting in the U.S. Semiconductor Industry, 1979–1995*, 32 RAND J. ECON. 101, 104, 125 (2001).

248. Mann, *supra* note 246, at 990–91.

249. See Xuan-Thao Nguyen & Jeffry A. Maine, *Giving Intellectual Property*, 39 U.C. DAVIS L. REV. 1721, 1739 (2006). The benefit of such donations has decreased due to legislation. *Id.* at 1748–49.

250. Parchomovsky & Wagner, *supra* note 8, at 31–42 (articulating the benefits to either scale- or diversity-based patent portfolios).

that same technical area and, in turn, strengthens the patent holder's position in the related industry.²⁵¹

Accordingly, when these costs and benefits are weighed, most inventors err on the side of filing early. To be sure, not everyone errs on the side of filing early. The less sophisticated inventor may lack the knowledge of the patent system to understand it is in her best interests to file early, or she may not have quick and easy access to the resources and assistance needed to file an application. But most companies who invent have the sophistication and the infrastructure in place to exercise the option to file early and avoid losing patent exclusivity over the invention. For these patent players, the system pushes them to file first and ask questions later.

2. *The "File Early, File Often" Mentality*

After an inventor files early, she gains more information about her invention. The development process, shown in Figure 1 above, marches on. Further invention information is either generated internally, through the ongoing technical definition of the invention or from market research, or externally, through changes in complementary technologies, technological processes, or market information.²⁵² Patent law allows the inventor to use this information to further shape her exclusive rights over the invention.²⁵³ She can ask for additional patent protection and utilize this new information when drafting new patent claims.²⁵⁴ The ability to file for additional protection gives an inventor the ability to "file often." And inventors do file often by supplementing their initial filings with continuations or continuations-in-part, or by filing new applications altogether.²⁵⁵

a. Continuations

Under the current patent system, the applicant always has the right to "continue" the prosecution of her patent application.²⁵⁶ This means that even after a patent examiner has issued a "final rejection" of a patent application's claims, the applicant can file a continuation

251. *Id.* at 37 ("In an environment where individual patents are increasingly of questionable value, it is the patent portfolio that is assuming the role of providing meaningful patent-type protection in the modern marketplace.").

252. *See supra* Part III.A.

253. *See supra* Part III.A.

254. *See supra* Part III.A.2.

255. Cecil D. Quillen, Jr. et al., *Continuing Patent Applications and Performance of the U.S. Patent and Trademark Office—Extended*, 12 FED. CIR. B.J. 35, 38 (2002) (noting that these follow-up applications make up a significant percentage of pending patent applications).

256. 35 U.S.C. § 120 (2006); Mark A. Lemley & Kimberley A. Moore, *Ending Abuse of Patent Continuations*, 84 B.U. L. REV. 63, 67–69 (2004) (explaining the continuation process). A special form of continuation, a request for continued examination, works in a similar way to a continuation. *See* 35 U.S.C. § 132(b).

application to try again and get patent protection for the invention.²⁵⁷ The filing of a continuation can also occur when the examiner eventually allows claims in the original application, potentially amended to respond to an initial rejection, or the applicant expressly abandons all of the claims in the original application.²⁵⁸ One of the main reasons behind filing a continuation application is the ability to include new patent claims that capture different aspects of the invention.²⁵⁹ While the new claims must be supported by the original application,²⁶⁰ the new claims can recite aspects of the invention not originally claimed or vary the level of specificity of what is claimed in contrast to the original claims.²⁶¹

When an inventor learns about another technical aspect of an invention that is important or becomes aware that a certain variation of the invention is commercially advantageous, the inventor can include claims to cover this new information in the application. These new claims can be included in the original application via an amendment. But, in most cases, applicants introduce such new claims in a continuation.²⁶² The new information prompts a new filing—the filing of a continuation application.

New information about a competitor's use of the invention also prompts the filing of continuations. A common use of a continuation application is to draft claims that cover an embodiment of the invention being used by a competitor that becomes known after the initial filing.²⁶³

The ability to continue to define new patent protection encourages most inventors to always keep a continuation of an originally filed application on file.²⁶⁴ As long as the applications overlap in their pendency, the applicant can include any claims that are originally supported.²⁶⁵ The pending applications give an applicant the option of getting patent protection at any time and getting protection that is

257. See 37 C.F.R. § 1.113 (2008) (defining a final rejection); Lemley & Moore, *supra* note 256, at 64.

258. Lemley & Moore, *supra* note 256, at 67–69.

259. There are other reasons, such as trying to convince the examiner to allow an already filed set of patent claims. *Id.* at 64.

260. See 35 U.S.C. § 120; *Vas-Cath Inc. v. Mahurkar*, 935 F.2d 1555, 1560 (Fed. Cir. 1991) (noting that newly added claims must be described and enabled by the original specification).

261. See Mark A. Lemley & Carl Shapiro, *Probabilistic Patents*, 19 J. ECON. PERSPECTIVES, Spring 2005, at 75, 81–82 (“Two of the most common practices used by patentees to increase their chances of winning the patent lottery are continuations and a proliferation of closely related patents.”).

262. See Lemley & Moore, *supra* note 256, at 64.

263. See, e.g., *Gentry Gallery, Inc. v. Berkline Corp.*, 134 F.3d 1473, 1479 (Fed. Cir. 1998) (“[The patentholder] admitted at trial that he did not consider placing the controls outside the console until he became aware that some of Gentry’s competitors were so locating the recliner controls.”).

264. Lemley & Moore, *supra* note 256, at 81 (“In some industries, notably biotechnology and pharmaceuticals, firms typically keep a continuation application pending during the entire lifetime of the original patent.”).

265. See 35 U.S.C. § 120.

tailored to what the applicant or a competitor is doing.²⁶⁶ That is, there is always an application on file where the applicant can apply new information she learns either internally or externally.²⁶⁷ Thus, applicants “file often” by habitually filing continuations. This tendency is a direct response to the fact that original filing occurs so early, with so little invention information.

b. Continuations-in-Part and New Applications

Another option the inventor has is to file a new application when new information is produced. This usually takes the form of a “continuation-in-part”—where a new filing overlaps with an originally filed application but contains a new “invention” in that there are additions to the disclosure that were not originally described in enough detail to meet the written description and enablement requirements to patentability.²⁶⁸ These continuations-in-part do not enjoy the original application’s filing date for the newly added material because these new parts of the disclosure were technically invented after the filing date.²⁶⁹ The common continuation-in-part situation is an improvement to the original invention.

By filing a continuation-in-part, or a new application, the applicant can capture follow-on inventions that she develops after the early filing date. The patentability of these improvements is limited by the original patent application, which is now potential prior art.²⁷⁰ However, the ability to file a continuation in part or new application demonstrates another way in which the patent system allows an inventor to compensate for information she lacked at the time of filing by filing for more patent protection when new information comes to light. Put another way, an inventor can also “file often” by filing a continuation in part or new application, both of which build off the original application and initial invention.²⁷¹

C. EARLY FILING EXACERBATES THE PATENT SYSTEM’S PROBLEMS

Early filing and the overfiling it causes contribute to the recently identified ills of the patent system. By forcing inventors to err on the side of filing early and then following up with filing often, the early-filing system overloads the examination process and increases the ever-

266. *See id.*

267. *See id.*

268. *In re Klein*, 5 U.S.P.Q. (BNA) 259 (Comm’r Pat. 1930).

269. *See, e.g., PowerOasis, Inc. v. T-Mobile USA, Inc.*, 522 F.3d 1299, 1310–11 (Fed. Cir. 2008) (limiting the continuation-in-part’s claims that are not supported by the earlier disclosure to the continuation-in-part’s filing date).

270. *See* 35 U.S.C. § 102.

271. These are all typically considered to be of the same “family” of patents.

expanding population of issued patents. The problems created continue because the earlier the patent is filed in the development cycle, the greater the likelihood that the issued patents are never developed.²⁷² These circumstances incentivize patent holders to become “patent trolls” because it is cheaper to enforce an early-filed patent than it is to commercialize it.²⁷³ Early filing also increases the likelihood that the boundaries the patent defines are unclear due to the lack of invention-specific information available in such early filed patents.²⁷⁴ While these are all problems in their own right, they also directly undermine the previously articulated benefits to early filing.

1. Early Filing Encourages Additional Applications and Additional Patents

The early-filing doctrine results in more applications being filed. As described above, at the early filing stage, most inventors err on the side of filing patent applications.²⁷⁵ Inventions that have some commercial potential, regardless of how remote, are claimed in patent applications.²⁷⁶ This includes inventions that, if filing decisions were made later in the development process, would not be converted into patent applications because, at this later time, they clearly lack value. And the earlier filing occurs, the more product configurations are in the mix upon which patent applications can be filed. As shown in Figure 1, there are just more potential products to patent early in the development process.²⁷⁷ All of these factors combine to create more patent applications than if patenting was decided later in the development process.

In addition to these initial filings are the numerous follow-on filings.²⁷⁸ As new information about an invention surfaces, an inventor files more applications. These additional applications take the form of continuations, continuations-in-part, or new applications. The early-filing doctrine not only adds additional original applications on the front end—where applications are filed to play it safe—but the doctrine also causes more applications to be filed during the prosecution of the original application to make up for the lack of information on the front-end.

The problem with these additional applications is that they contribute to an overloaded patent examination system. One of the major causes of the issuance of “bad patents”—patents covering inventions that are actually unpatentable—is the USPTO’s inability to

272. See *supra* Part III.B.1.

273. See *supra* Part III.B.1.

274. See *supra* Part I.A.1.

275. See *supra* Part III.B.1.

276. See *supra* Part III.B.1.

277. See *supra* Part III.A.

278. See *supra* Part III.B.2.

thoroughly examine each application.²⁷⁹ The number of patent applications is rising exponentially each year while, at the same time, the USPTO faces a significant examiner attrition rate.²⁸⁰ Examiners are thus given very little time to perform a complete examination and determine whether the claimed invention is patentable.²⁸¹ The addition of more patent applications because of the early-filing doctrine adds to the overload problem, causing examiners to spend even less time on each application and, as a result, do a worse job of weeding out applications for unpatentable inventions.

More applications also means more patents issued. Early filing has the same multiplier effect on issued patents as it does on filed ones. Not only are marginally-valuable patents filed and then issued, early filing on even valuable patents prompts “make-up” filing later in the process, with continuations and new applications.²⁸² These follow-on filings add even more issued patents to the mix. Where there may have been only one patent issued for a given product, applicants seek—and get—multiple patents to compensate for the lack of information early in the development process.²⁸³

The high volume of issued patents creates problems of its own. The more patents there are, the more likely there will be patent thickets—areas of technology encumbered by numerous patents on various aspects of the technology.²⁸⁴ The number of thicket situations increases when patents are issued from continuations or continuations in part since these types of filings, by definition, cover the same general invention but with a

279. See Doug Lichtman & Mark A. Lemley, *Rethinking Patent Law's Presumption of Validity*, 60 STAN. L. REV. 45, 46–47 (2007) (identifying the resource problem faced by the USPTO to effectively review the growing number of applications); John R. Thomas, *Collusion and Collective Action in the Patent System: A Proposal for Patent Bounties*, 2001 U. ILL. L. REV. 304, 314 (“[T]he average time allocated for an examiner to address one application is understood to be between sixteen and seventeen hours. Given the complexities involved in parsing an application, conducting a prior art search and drafting an Office Action, this period is surprisingly short.”).

280. See Beth Simone Noveck, “Peer to Patent”: *Collective Intelligence, Open Review, and Patent Reform*, 20 HARV. J.L. & TECH. 123, 132 (2006) (“[T]he USPTO still cannot hire quickly enough to keep pace with both the demands of the job and the attrition rate.”).

281. Thomas, *supra* note 279 (noting that examiners are allotted sixteen to seventeen hours per application).

282. See *supra* Part III.B.2.

283. See, e.g., Parchomovsky & Wagner, *supra* note 8, at 31–42 (discussing the prevalence of “scale” portfolios).

284. Carl Shapiro, *Navigating the Patent Thicket: Cross Licenses, Patent Pools, and Standard Setting*, in 1 INNOVATION POLICY AND THE ECONOMY 119, 121 (Adam B. Jaffe et al. eds., 2001) (“[O]ur patent system, while surely a spur to innovation overall, is in danger of imposing an unnecessary drag on innovation by enabling multiple rights owners to ‘tax’ new products, processes, and even business methods.”); Michael A. Heller & Rebecca S. Eisenberg, *Can Patents Deter Innovation? The Anticommons in Biomedical Research*, 280 SCIENCE 698, 698–99 (1998) (arguing that an increase in private intellectual property rights in biomedical research may reduce the total amount of such research).

varying set of claims.²⁸⁵ Sheer numbers of patents also make it tough for competitors to digest even unrelated patents.²⁸⁶ High numbers also allow patent holders to easily overwhelm competitors or potential licensees, making it difficult for such targets to properly evaluate the patents' worth or defend against them in litigation.²⁸⁷

Since these patents are issued from an overburdened USPTO, some of the patents will be invalid ones. Issuance of these bad patents, in addition to creating the problems mentioned above, comes with its own set of harms. A bad patent, for example, may give its holder exclusive control over a minor technological advance, creating roadblocks to innovation that are typically not permitted under patent law.²⁸⁸ Since even poor-quality patents enjoy a presumption of validity, the patentee can threaten to stop others from practicing what they rightfully can do or she can seek licensing fees for activities that are actually allowable.²⁸⁹ The bad patents create *in terrorem* effects, deterring socially acceptable and beneficial behavior.²⁹⁰ Those who want to use the patented technology must expend significant resources to determine whether the patent is invalid and, if forced, spend money to legally establish this fact.

A final problem with early filing increasing the number of applications and overburdening the patent application process is that this situation delays the expiration of filed patents. More applications not only causes poor examination, it also leads to a delay in examination. The explosion of applications is identified by many as causing the ever-increasing delay in USPTO action on pending applications.²⁹¹ While the patent term is measured from the time of filing,²⁹² delays in prosecution caused by the USPTO do not reduce the patent term. The patent system "credits" the patentee for such delays, increasing the patent term in proportion to the delays caused by the USPTO.²⁹³ This means that delays caused by an increase in applications because of the early filing doctrine

285. Lemley & Shapiro, *supra* note 261, at 81–82.

286. See Parchomovsky & Wagner, *supra* note 8, at 35–36.

287. *Id.*

288. See MERGES & DUFFY, *supra* note 83, at 647; Cotropia, *supra* note 86, at 1525 ("Exclusive control over these minor developments would act as roadblocks, creating disincentives to future inventors. Many patents on small technical advances make it extremely difficult and 'expensive to search and to license' these patents in order to produce further innovations.").

289. See Lichtman & Lemley, *supra* note 279, at 47 (noting that the presumption of validity makes "defendants face an uphill battle persuading the courts to overrule that errant determination.").

290. See John R. Thomas, *The Responsibility of the Rulemaker: Comparative Approaches to Patent Administrative Reform*, 17 BERKELEY TECH L.J. 727, 731 (2002) (detailing these detrimental effects).

291. See Jason J. Chung, Note, *Patent Pendency Problems and Possible Solutions to Reducing Patent Pendency at the United States Patent and Trademark Office*, 90 J. PAT. & TRADEMARK OFF. SOC'Y 58, 63 (2008).

292. 35 U.S.C. § 154(a)(2) (2006).

293. See *id.* § 154(b) (establishing the adjustment of the patent term due to USPTO delays).

extend the time period between patent filing and patent expiration.²⁹⁴ A delayed patent expires later, beyond the traditional twenty years from the filing date.²⁹⁵

This de facto increase in patent term due to early filing negates the socially-beneficial gains of early filing identified by Duffy. Duffy views early expiration as a benefit to early filing.²⁹⁶ Because of the overload early filing puts on the USPTO, early filing does not necessarily lead to early expiration. It is true that the early filing doctrine leads to the patent getting filed earlier, and the expiration clock starting to tick earlier. But the delays early filing creates at the USPTO lengthen the patent term, causing expiration and public dedication to happen later. If the delays become long enough, the credited time may be sufficient to, on net, lead to later expiration of the earlier-filed patent than if the patent was filed later. This problem—contributed to by overfiling—counteracts any gains in earlier patent expiration allegedly created by the early-filing doctrine.

2. *Early Filing Leads to Underdevelopment of Patented Technologies*

More patents filed, examined, and issued is not necessarily a bad thing. Patent theory presumes that a socially-beneficial product or technology accompanies each issued patent.²⁹⁷ This is the exchange society obtains—a new and non-obvious technology in return for the grant of a limited period of exclusivity.²⁹⁸ If the early-filing doctrine leads to more of a good thing—that is, more technological progress—then the extra applications are not a concern. The problem is that the earlier a patent is filed in the development cycle, the less likely the covered invention is ever commercialized.

294. See Posting of Dennis Crouch to Patently-O, Extending the Patent Term: Most Patents Are Extended Due to PTO Delay, <http://www.patentlyo.com/patent/2008/03/extending-the-p.html> (Mar. 14, 2008, 13:00 CDT) (establishing that most patent terms are extended due to USPTO delays).

295. See 35 U.S.C. § 154(b).

296. See *supra* Part II.C.

297. See *Mazer v. Stein*, 347 U.S. 201, 219 (1954) (“The economic philosophy behind the clause empowering Congress to grant patents and copyrights is the conviction that encouragement of individual effort by personal gain is the best way to advance public welfare through the talents of authors and inventors in ‘Science and useful Arts.’”) (quoting U.S. CONST. art. I, § 8)).

There are other theories as to the ultimate value of patents. Patents facilitate the disclosure of inventions, and the disclosures add to the public knowledge. See Rebecca S. Eisenberg, *Patents and the Progress of Science: Exclusive Rights and Experimental Use*, 56 U. CHI. L. REV. 1017, 1028 (1989) (“The incentive to disclose argument, which has been more popular with the courts than with commentators, rests on the premise that in the absence of patent protection inventors would keep their inventions secret in order to prevent competitors from exploiting them. Secrecy prevents the public from gaining the full benefit of new knowledge and leads to wasteful duplicative research.”).

298. See NARD, *supra* note 123, at 30–31 (noting patent law’s role “in inducing the transformation of inventions into downstream, commercialized products”).

First, the earlier an application is filed, the more likely the application is filed on an invention that is never commercialized. As previously mentioned, and graphically depicted in Figure 1, many early technological ideas turn out to be technically unfeasible or commercially worthless and therefore are never commercialized.²⁹⁹ Inventors still file applications on these early ideas because, at the early stages, they all have commercial potential. As time goes by, and development continues, the inventor figures out which inventions—and thus which patents—are still commercially viable and which are not. And the earlier the filing, the more inventions that are inevitably not commercialized make their way into the USPTO, are examined, and become the subject of issued patents.³⁰⁰

Viewing patents as options—specifically options to commercialize—further drives this point home. Patent rights can be analogized to real options, and particularly to a call option. Thus the patent provides the ability to decide at a future date to exercise the patent exclusivity option to gain the exclusive right to commercialize the claimed invention.³⁰¹ Patents have an exercise price³⁰²—the cost of commercialization—and a purchase price—the cost of filing of a patent application and the accompanying development needed to qualify for patent protection.³⁰³ A patent can therefore be depicted graphically as a call option, as shown below in Figure 2.

299. See *supra* Part III.A.

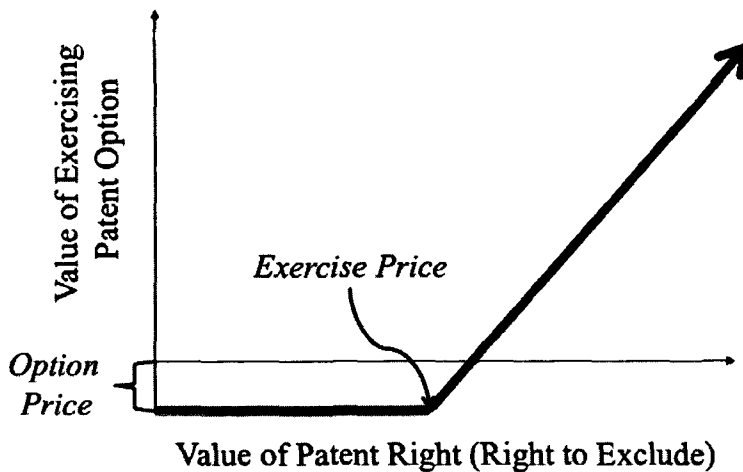
300. See *supra* Part III.B.1.

301. Cotropia, *supra* note 208, at 1134 (“Many have made the general analogy—describing in broad terms how operationally a patent, particularly the accompanying right to exclude and the predefined patent term, behaves like a real option.”); see Abramowicz, *supra* note 14, at 1073 n.23 (citing Martin & Parnoy, *supra* note 208).

302. The exercise price is “the amount of money invested to exercise the option if you are ‘buying’ the asset (with a call option).” TOM COPELAND & VLADIMIR ANTIKAROV, *REAL OPTIONS: A PRACTITIONER’S GUIDE* 6 (2003).

303. See Cotropia, *supra* note 208, at 1135–39 (describing in detail the components of the exercise and purchase price of a patent option).

FIGURE 2: PATENT AS CALL OPTION



The initial value of the option is negative given that there is a purchase price for a patent—a combination of the cost of filing and the development expenditures needed to meet the patent requirements.³⁰⁴ Once filed, the potential value cannot go lower than the purchase price.³⁰⁵ The option's upper value is defined by the value of having exclusive rights to commercialize the patented invention.³⁰⁶ This value is not realized until the option—the patent—is exercised by using the patent's exclusivity to assist in the commercialization of the underlying invention.³⁰⁷

Since the patent system requires only conception and the drafting of a patent application, the purchase of a patent option is relatively inexpensive.³⁰⁸ In contrast, the potential value of the option at this early stage is quite high due to the lack of information about the invention and the accompanying uncertainty. As mentioned above, this is the combination that makes the filing of an application—the purchase of the patent option—too good a deal to pass up.³⁰⁹ And since there are so many

304. *See id.* at 1135–37.

305. *See id.*

306. *Id.* at 1137–38. As time passes, the value becomes more identifiable. *See Abramowicz, supra* note 14, at 1091.

307. *See Cotropia, supra* note 208, at 1137–38 (identifying this commercial way to exercise a patent option); Dam, *supra* note 124, at 247 (noting that patent exclusivity allows the patentee to commercialize at a price to recoup research and development costs).

308. *See Abramowicz, supra* note 14, at 1091 (“When patenting is relatively inexpensive, it may be worthwhile to obtain a patent even when the chances that the patent will be practical to develop are very low.”); Cotropia, *supra* note 208, at 1135–37 (describing the low option price of a patent right).

309. *See supra* Part III.B.1.

potential ideas available at the early filing stage, there are more options—more patentable inventions—purchased. As time passes, the true value of the option—the value of commercialization—becomes clearer and some options will turn out not to be worth exercising. An unexercised patent option is a patented invention that is not commercialized.³¹⁰ Therefore, looking at patents as options provides another description as to why early filing leads to more underdevelopment of patented inventions. Essentially, early filing leads to more bets—option purchases by way of patent filings—that go bad and have no payout because they cover inventions not worth commercializing. Thus, inventors may fold—they choose not to commercialize.

There is another reason why early filing leads to underdevelopment of patented inventions. Early filing creates a situation where few resources are required to file a patent application and, in contrast, much more resources are required to commercialize the patented invention. The patent system does not require much development prior to filing and so, after filing, the inventor has a long way to go to commercialization.³¹¹ As Figure 1 demonstrates, there are usually many stages to new product development, where both technical and market information is generated in order to identify the product configuration truly worthy of commercialization.³¹² Since patenting happens at an early development stage, there is a long way to go until commercial launch of the patented invention.

This situation can be recharacterized under the patents as real options theory. The lower the purchase price of the patent option—that is, the less development needed to file a valid application—the higher the exercise price—the cost of commercialization.³¹³ Since there is little invested in the front end (i.e., the option's price was low), exercising the option is a bigger step than it would be if the option was purchased later in the development cycle and there were already more sunk development costs. Figure 3, below, represents this relationship graphically. The less development needed to file for a patent, the more the exercise cost will be.

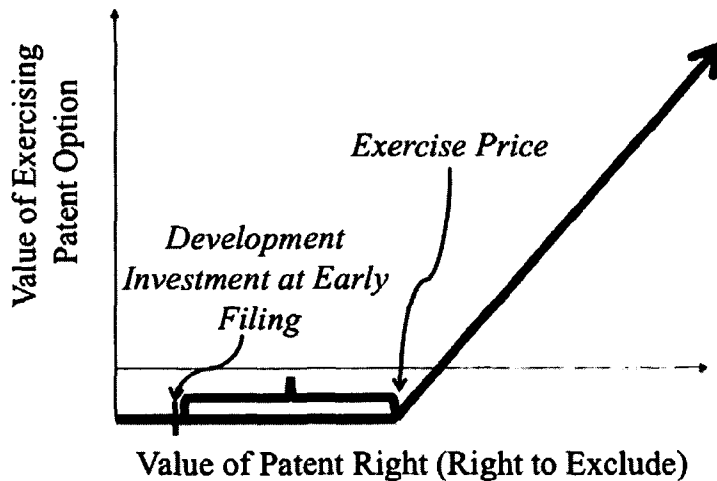
310. See *infra* Part III.C.3.

311. See *supra* Part I.A.1.

312. See *supra* Part III.A.1.

313. See Abramowicz, *supra* note 14, at 1083 (“Imposing minimal requirements for obtaining a patent will decrease both the price of the patent option and the chance that the option will never be exercised.”).

FIGURE 3: TIME OF FILING AND EXERCISE PRICE



The problem with these circumstances is that they lead to even less commercialization of patented inventions. Since the early filing system requires little buy-in on the front end, patent holders are not as invested in the claimed technologies, and so they are less interested in commercializing.³¹⁴ At the very least, they will wait longer from the time of filing before they develop the technology, as compared to if they had paid more for the option initially.³¹⁵ Commercialization appears as a high hurdle compared to the initial investment to get the patent. Abramowicz comes to a similar conclusion, working through proofs to establish that, when taking uncertainty into account, the earlier in the development process a patent is obtained, the more likely the invention is never developed.³¹⁶

A third reason early filing increases the likelihood of underdevelopment is the management perspective problem early filing creates. The further away the ultimate benefit (i.e., commercialization) is from an initial purchase (i.e., the filing of the patent), “the less the resources applied to manage it.”³¹⁷ That is, management is more likely to ignore, and in turn devote less energy to pursuing, long-term interests.³¹⁸

314. *Id.*

315. *Id.*

316. *Id.* at 1090.

317. Johnson, *supra* note 230, at 276.

318. Abramowicz makes an additional argument that supports the conclusion that early filing leads to underdevelopment. He argues that the earlier the filing, the more likely a patent holder will wait longer to commercialize and, in the end, possibly never commercialize. See Abramowicz, *supra* note

The patented invention, or at least patent protection, is more likely to be forgotten the further patenting is from the end goal of commercialization.

This underdevelopment of patented invention, for the reasons articulated, can have serious consequences because it can only hamper, as opposed to promote, technological progress. These patents, by definition, cover technologies that are commercially worthless in the eyes of their owners and do not generate a social benefit on their own. But they still drag down the development of other technologies. They contribute to the patent thicket situation already discussed, creating roadblocks to innovation.³¹⁹ A competitor does not know, without some investigation, that the patent does not specifically exclude the technology he is pursuing.³²⁰ Accordingly, these early-filed and undeveloped patents do little more than generate costs to other developers.³²¹

Uncommercialized patents also fuel the use of patents as a litigation tool. As observed by Shaun Martin and Frank Partnoy, it is much cheaper to exercise the patent option by litigating as opposed to commercializing because litigation is cheaper to initiate and has less of a downside than commercial development.³²² Such litigation is discussed in more detail below—usually viewed as patent-troll litigation where a noncommercializer seeks rents from others.³²³ Using a patent to simply generate rents as opposed to commercialize is viewed as socially negative behavior.³²⁴ The early-filing doctrine facilitates this situation by creating a host of patents that are unlikely to be, and too costly to be, commercialized.

Finally, the overfiling of these patents, also caused by the early-filing doctrine, simply magnifies the number of undeveloped patents. While continuations and new applications are filed later, and are therefore more likely to be commercialized, some still necessarily go

14, at 1090–91. Abramowicz observes that, while each year without commercializing loses the patentee potential profit, the additional year also begets more information and more certainty as to the potential commercial worth of the invention. *Id.* Abramowicz notes that choosing to wait can continue until the patent expires, and in turn the option to develop expires. *Id.* While this may be the case, it seems unlikely that since patents give the holder the option to delay commercialization, the patent holder will delay past the inherent optimum time to commercialize. That is, when the invention becomes beneficial to commercialize, the patent holder will commercialize even if they could wait longer. *See id.*

319. *See supra* Part III.C.1.

320. *See supra* Part III.C.1.

321. *See supra* Part III.C.1.

322. *See* Martin & Partnoy, *supra* note 208; *see also* Cotropia, *supra* note 208, at 1138–39, 1147 (furthering this discussion).

323. *See infra* Part III.C.3.

324. *See infra* Part III.C.3.

undeveloped. These additional patents generate even more waste and negative impact on society.

The patent system attempts to counteract underdevelopment by reducing remedies available for patents that are not commercialized by their owners.³²⁵ This is unlikely to deter the increase in initial, early filings that leads to undeveloped patents. When filing, the inventor is unsure about commercialization and thus values the patent as including the possibility of commercialization and the accompanying full enforcement to protect that commercialization. This valuation may be discounted slightly by a possible reduction in remedies, but such a change on the very back end is unlikely to influence the front-end analysis. Such lack of devaluation is particularly true when considered in light of all of the uncertainty surrounding the decision to file early in the development process.

This result from early filing—underdevelopment of the patented technology—directly negates one of the benefits of early filing articulated by Kitch. Kitch viewed early filing as one of the ways patents acted as prospects and, in turn, promoted commercialization.³²⁶ For a good number of patents, early filing is more likely to have the opposite effect. Patents go uncommercialized because they were filed on inventions that are not worthy of commercialization. Patent holders are less likely to commercialize because commercialization is comparatively more costly. And given the distance between early filing and commercialization, patent holders are less likely to pay close enough attention to commercial prospects. In contrast, early filed patents are more likely to be used in litigation as opposed to development. All of these insights comment on the actions of the patent holder—the technology manager under Kitch’s analysis³²⁷—and how she acts in the face of uncertainty and little initial investment in, or information on, the invention’s commercialization and commercial value.

3. *Early Filing Fosters Patent Trolls*

The early filing doctrine, by prompting overfiling and underdevelopment, fosters patent trolls. Individuals who seek to develop a given technological solution are pushed to file early—shortly after conception—and then most likely do not devote the resources to commercialize the patented technology for the reasons articulated above.³²⁸ These unused patents can create problems. Instead of letting the patent sit dormant, the inventor, or someone who purchases the patent,

325. See, e.g., *eBay, Inc. v. MercExchange, LLC*, 547 U.S. 388, 389–90 (2006).

326. Kitch, *supra* note 12, at 266.

327. *Id.* at 276.

328. See *supra* Part III.C.2.

is likely to take the lower-cost avenue of asserting the patent in litigation to extract rents from those who have commercialized in the patented area. Put another way, the patent system's early-filing doctrine causes inventors to file and, when the patent issues, the patent is more likely to be asserted for litigation purposes as opposed to commercialized.³²⁹ Those who use the patent to simply extract rents, as opposed to clear commercialization space, are labeled "patent trolls."³³⁰

Early filing produces more applications and, in turn, more patents. These additional patents, particularly those filed early in the development cycle, are rarely developed fully. This lack of development is sometimes due to the high cost of commercialization compared to the low initial investment in patenting.³³¹ Martin and Partnoy recognized that there is a cheaper exercise price for the patent option—asserting the patent right against someone else.³³² They note that litigating is cheaper than commercialization.³³³ There is less risk as well, given that the only downside to litigating is attorney fees and losing the patent as compared to being burdened with sunk costs and fixed resources tailored to a possibly unprofitable commercial product or process.³³⁴ This comparative cost advantage to litigating prompts more patent holders to exercise their patent options by asserting the patent in litigation as opposed to commercializing. This comparison is depicted below in Figure 4, with assertion having a lower exercise price than commercialization.³³⁵

329. Cotropia, *supra* note 208, at 1138–39, 1147; Martin & Partnoy, *supra* note 208.

330. Brenda Sandburg, *Trolling for Dollars*, RECORDER (S.F.), July 30, 2001, at 1 (describing the term as defined by its creator, Peter Detkin, then assistant general counsel for Intel Corporation).

331. See Martin & Partnoy, *supra* note 208; see also Cotropia, *supra* note 208, at 1138–39, 1147 (identifying assertion as an alternative way to exercise a patent option).

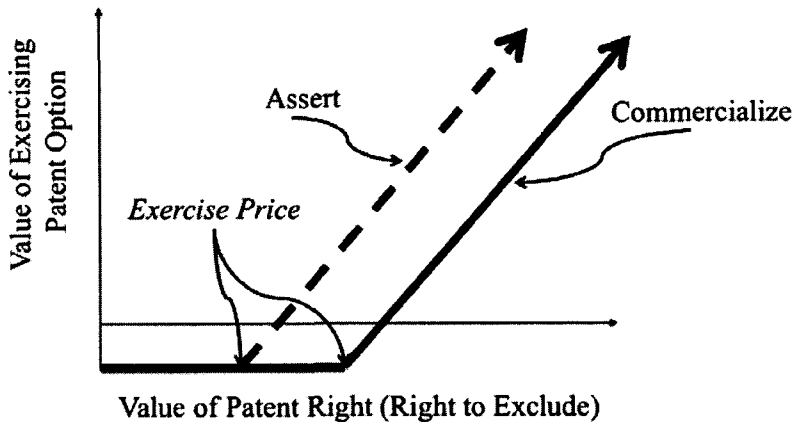
332. *Supra* note 331.

333. Martin & Partnoy, *supra* note 208; see Cotropia, *supra* note 208, at 1138–39 (noting that the difference may be even greater, given that commercialization may involve the additional cost of assertion because "some level of assertion of the patent right may be required to keep the market clear for the patentee's product").

334. See Cotropia, *supra* note 208, at 1138–39.

335. The value of the option may be less when it is exercised through assertion as opposed to commercialization, but not in all cases.

FIGURE 4: ASSERTION VERSUS COMMERCIALIZATION



This type of activity, fostered by the early filing doctrine, is the behavior that defines the patent troll. The term “patent troll” includes “somebody who tries to make a lot of money off a patent that they are not practicing and have no intention of practicing and in most cases never practiced.”³³⁶ A “patent troll” is a patent holder that does not produce anything related to the patent she holds.³³⁷ The troll is not using the patent to protect her own manufacturing efforts.³³⁸ Trolls also rarely perform much research and development themselves.³³⁹ They basically do not participate in the marketplace.³⁴⁰ Instead, patent trolls use their patents to obtain value by licensing the patent to those who have already begun production of the manufactured technology.³⁴¹ The patent is simply a revenue stream generator. This definition lines up with what most early filers, or the purchasers of early filed patents, are likely to do with their patents—assert the patent instead of commercialize it.

Patent trolls are generally frowned upon because they act as only “tollkeeper[s]” on the road of innovation.³⁴² They tax innovation by

336. Sandburg, *supra* note 330.

337. See, e.g., Robert P. Merges, *Introductory Note to Brief of Amicus Curiae in eBay v. MercExchange*, 21 BERKELEY TECH. L.J. 997, 997 (2006).

338. Jeremiah Chan & Matthew Fawcett, *Footsteps of the Patent Troll*, 10 INTELL. PROP. L. BULL. 1, 5 (2005).

339. Merges, *supra* note 337.

340. Jason Rantanen, *Slaying the Troll: Litigation as an Effective Strategy Against Patent Threats*, 23 SANTA CLARA COMPUTER & HIGH TECH. L.J. 159, 160 (2006).

341. Chan & Fawcett, *supra* note 338, at 5.

342. Merges & Nelson, *supra* note 115, at 907 (using the term “tollkeeper” to identify a patentee that does not assist the real-world development of the invention but simply takes license revenue for that development).

extracting licensing revenue without giving anything back in return.³⁴³ Because patent trolls have no intention of developing or assisting in the development of the technology covered by the patents they hold, they provide no benefit to society. Instead, “[b]y acquiring [patent] claims and threatening or pursuing litigation, the patent trolls seek and often receive economic settlements from genuine innovators and producers that greatly exceed the true economic value of the patents in question.”³⁴⁴ This goal is characterized as “harmful rent-seeking.”³⁴⁵

The fostering of patent trolls further rebuts the alleged commercialization advantages of the early filing doctrine. Not only does early filing fail to result in commercialization of the patented invention, it also promotes the anticommercial use of patents as litigation instruments and nothing more.

4. *Early Filing Contributes to Unclear Patent Boundaries*

The early-filing doctrine also leads to unclear patent boundaries. The scope of patent protection is defined by patent claims. The interpretation of these claims is a major part of any patent evaluation or enforcement.³⁴⁶ As I have argued before, determining the exact contours of these boundaries presents an information cost problem.³⁴⁷ That is, even if the specific interpretation methodology being used is clearly defined, determining claim meaning still involves obtaining, understanding, and using invention-specific information.³⁴⁸

At the early-filing stage, there is a minimal amount of technical and market information about the invention. This dearth of information impacts the patent application. The components that traditionally aid in the definition of the patent claims—particularly the specification and embodiments and drawings contained therein—are not robust because of this lack of invention-specific information. This lack of information affects the claim interpretation process—making it difficult for the USPTO, courts, and other patent players to determine the definitive scope of patent protection.³⁴⁹

The need to file early also prompts the inventor to intentionally draft the patent application, including the patent specification and

343. See Brief of Amicus Curiae Yahoo! Inc. in Support of Petitioner at 2–3, *eBay Inc. v. MercExchange, LLC*, 547 U.S. 1015 (2006) (No. 05-130).

344. *Id.* at 6–7.

345. Michael J. Meurer, *Controlling Opportunistic and Anti-Competitive Intellectual Property Litigation*, 44 B.C. L. REV. 509, 509 (2003).

346. See Christopher A. Cotropia, *Patent Claim Interpretation Methodologies and Their Claim Scope Paradigms*, 47 WM. & MARY L. REV. 49, 65–69 (2005).

347. See Christopher A. Cotropia, *Patent Claim Interpretation and Information Costs*, 9 LEWIS & CLARK L. REV. 57, 59–60 (2005).

348. *Id.* at 90–91.

349. *Id.* at 77–81.

claims, in vague and general terms. The specification needs to be intentionally general so that it can support later-filed continuations.³⁵⁰ These continuations, filed to capture later-developed information, do not enjoy the filing date of the original application unless the earlier specification supports the new claims.³⁵¹ The inventor needs to draft the original specification in such a way so that she can argue that the newly filed claims were invented at the original specification's filing date. The more general and vague the original disclosure is, the more likely support is found. By drafting in vague and general terms, the applicant is leveraging off of the skill in the art and reasonable experimentation to fill the gaps of the nonspecific disclosure. This gives her flexibility when later articulating the invention that was earlier disclosed.³⁵² Early filing prompts this type of vague specification because the applicant knows that she will have to fill holes with continuations later and she needs support for these continuations in the original application.

Early filing encourages general and vague patent claims in another manner as well. When drafting patent claims early in the technological development process, the applicant does not know the specific "shelf space" she will need.³⁵³ She does not know what claim protection is most valuable. Broad claims allow her to hedge her bet—it is more likely that the most valuable commercial form of the invention falls into a broad claim as opposed to a more specific claim.³⁵⁴ This need for vague claims also aids an applicant in the most likely use for an early filed patent—assertion in litigation. Broadly worded, unclear claims help in negotiations because they both appear to capture more subject matter and make it more difficult for the opposing party to value the litigation claims or the patent itself.³⁵⁵ Patent trolls are often said to intentionally seek "to acquire broad and nebulous patent claims that arguably

350. See *supra* Part III.B.2.

351. 35 U.S.C. § 120 (2006).

352. See, e.g., *Vas-Cath, Inc. v. Mahurkar*, 935 F.2d 1555, 1564–65 (Fed. Cir. 1991) (holding that drawings from a design patent can support, and give an earlier filing date to, a later filed utility patent).

353. Robert P. Merges, *Software and Patent Scope: A Report from the Middle Innings*, 85 *TEX. L. REV.* 1627, 1672 (2007) ("Patents are surely playing a role in the age-old battle over 'shelf space' in this competitive industry.").

354. See Christopher A. Cotropia, "After-Arising" Technologies and Tailoring Patent Scope, 61 *N.Y.U. ANN. SURV. AM. L.* 151, 171–73 (2005) ("[T]he broader the patent scope, the more protection the patent holder receives and the more competing products she can exclude.").

355. See Gerard N. Magliocca, *Blackberries and Barnyards: Patent Trolls and the Perils of Innovation*, 82 *NOTRE DAME L. REV.* 1809, 1829–30 (2007) ("As noted earlier, a vague patent makes it harder for defendants to determine the scope of its protection and hence unwilling to take the risk of going to trial.").

encompass existing technologies relied on by companies with deep pockets.”³⁵⁶

A vague and general patent specification and claim leads to unclear patent boundaries. These are the two primary means of determining the scope of exclusivity given by the patent. The claims are the primary tool used to define exclusivity and the specification is meant to inform the claims’ meaning.³⁵⁷ If both of these lack information about the invention and are intentionally drafted in general and vague terms, the process of defining the claims is difficult.³⁵⁸ There is also uncertainty as to the claims’ ultimate, correct meaning, with poor inputs into the claim interpretation process—vague and general claims and specification—resulting in erratic results.³⁵⁹

Unclear boundaries create many of the problems of the patent system. Jim Bessen and Michael Meurer point to unclear boundaries as the root cause of the current patent crisis.³⁶⁰ Unclear boundaries increase transaction costs surrounding patents—making licensing and settlement more difficult.³⁶¹ Companies face more uncertainty as to which patents block their innovations.³⁶² Patent holders have less understanding of who they may assert their patents against and what shelf space a patent provides.³⁶³ Courts and the USPTO must expend more judicial resources resolving the ambiguities created by unclear boundaries; and, in turn, appeals and reversals are more prevalent.³⁶⁴ Unclear boundaries also facilitate patent trolls and the ability to hold up innovators by asserting ambiguous patents.³⁶⁵ Unclear boundaries therefore magnify some of the

356. See Brief of Amicus Curiae Yahoo! Inc., *supra* note 343, at 6.

357. Cotropia, *supra* note 346, at 79–82.

358. *Id.* at 90–91.

359. *Id.*

360. BESSEN & MEURER, *supra* note 35, at 8–11 (concluding that the fuzzy and unpredictable boundaries of patents prevent them from “work[ing] well as property”).

361. Paul J. Heald, *Optimal Remedies for Patent Infringement: A Transactional Model*, 45 Hous. L. REV. 1165, 1170–71 (2008) (“The primary function of patent law is ill-served if the property right embodied in the patent has poorly defined boundaries and therefore does a poor job of reducing transaction costs.”).

362. BESSEN & MEURER, *supra* note 35, at 10 (“There is thus no reliable way of determining patent boundaries short of litigation.”).

363. *Id.* at 34–35 (noting how clearly-delineated property rights encourage investment into the protected property).

364. See, e.g., Christian A. Chu, *Empirical Analysis of the Federal Circuit’s Claim Construction Trends*, 16 BERKELEY TECH. L.J. 1075, 1096–97 (2001) (finding a growing trend of reversals of claim interpretation holdings).

365. See David A. Fitzgerald II, Note, *Saving Alternative Dispute Resolution in Patent Law: Countering the Effects of the Patent Troll Revolution*, 23 OHIO ST. J. ON DISP. RESOL. 345, 360 n.76 (“One of the ways patent trolls abuse the patent system is by filing continuing applications on their vague patents in order to extend the patent term long enough to have a big corporation infringe the patent.”).

earlier articulated harms of the early-filing doctrine—underdevelopment of early-filed patents and patent trolls. Essentially, ambiguous boundaries strike at the heart of the efficient workings of the patent system.³⁶⁶

IV. A SOLUTION—OPTIMIZING FILING TIME BY REQUIRING AN ACTUAL REDUCTION TO PRACTICE BEFORE ISSUANCE

The question is how to minimize the costs of the early filing system while still maintaining some of its benefits. Recent proposals addressing such problems as underdevelopment of patented inventions focus on the end of the patent's life, not its beginning. Abramowicz, for example, proposes extending patent terms via auctions to minimize risk of underdevelopment.³⁶⁷ Those who do focus on the time of filing suggest an even earlier filing date. Duffy recommends that patents be granted at a very early stage of the development process.³⁶⁸ And when commentators discuss moving patenting to a later point in the development process, they dismiss it. Abramowicz mentions the “policy lever” of “requiring more achievement up front” to reduce the problems with early filing.³⁶⁹ But he quickly rejects this solution as “crude.”³⁷⁰ He argues that to require more before filing “increases inefficient duplication” and “exercises the policy lever at the beginning of the patent term when the risk of underdevelopment is least clear.”³⁷¹

This Article explores the road less traveled—a possible front-end solution to the problems created by the early filing doctrine.³⁷² Filing

366. BESSEN & MEURER, *supra* note 35, at 8–13.

367. Abramowicz, *supra* note 14, at 1106–10.

368. Duffy, *supra* note 15, at 471–72; *see* Abramowicz, *supra* note 14, at 1082 (noting that Duffy considers moving filing later “but ends up offering the opposite recommendation: that patents should be granted at a very early stage when they are mere patent prospects”). Duffy explains that filing is moved earlier “based on the need to avoid duplication, not on a quixotic hope of limiting rivalry to preserve rents.” Duffy, *supra* note 15, at 498–99.

369. Abramowicz, *supra* note 14, at 1107.

370. *Id.*

371. *Id.*

372. Ted Sichelman is a notable exception, recently proposing a two-tier patent system, with initial patents and then a commercialization patent. *See* Ted Sichelman, *Commercializing Patents*, 62 STAN. L. REV. (forthcoming 2010) (on file with the Hastings Law Journal). Sichelman's solution goes much further than the one proposed here, creating a whole new patent right and various doctrinal changes to handle this new right (as well as the rights granted under our current system. *Id.* In contrast, my solution is much more targeted and, as will be explained, requires few changes to the current patent system.

Another potential front-end solution is limiting continuation practice, as proposed in recent rules from the USPTO. *See* Changes to Practice for Continued Examination Filings, Patent Applications Containing Patentably Indistinct Claims, and Examination of Claims in Patent Applications, 72 Fed. Reg. 46,716–843 (Aug. 21, 2007) (to be codified at 37 C.F.R. pt. 1). Notably, these changes, if they ever go into effect, *see* *Tafas v. Doll*, 559 F.3d 1345, 1364–65 (Fed. Cir. 2009),

early is what causes the problems articulated in Part III, so moving filing, or at least examination, to a later time is the most direct response. The question is how to change the timing without destroying the incentive to invent and exacerbating the problems early filing is meant to solve. There is also a need to change filing time in a meaningful, relevant way—something more than a simple time delay or indiscriminate increase of the filing fee.³⁷³ Particularly, a change in the patent requirements is needed that directly addresses the problems created by early filing. Patent rules need to increase the amount of invention information and certainty as to invention value available to an inventor prior to patenting.

Doing away with constructive reduction to practice and, in turn, requiring all applicants to actually reduce their invention to practice—that is, actually implement the invention and observe that it works for its intended purpose—before receiving a patent is the specific front-end response explored below. While not a perfect solution, such a requirement generates more technical information about the invention prior to patent issuance, moves the inventor further down the development path before examination, and gives the inventor a clearer picture of the possible commercial value of the invention prior to patenting. An actual reduction to practice requirement does not, however, go too far because of the doctrine's flexibility, its tailoring to the technology being invented, and the fact the doctrine stops well short of requiring full commercialization.

A. SPECIFICS OF THE SOLUTION: REQUIRING AN ACTUAL REDUCTION TO PRACTICE

An actual reduction to practice occurs when the inventor builds the product or performs the process for which she wishes to file an application and then appreciates that the real-world implementation of the invention achieves the intended results.³⁷⁴ Currently an actual reduction to practice is not required to “invent” under patent law.³⁷⁵ A constructive reduction to practice—the filing of a valid patent application—acts as a substitute.³⁷⁶

The proposed solution to the costs of the early-filing doctrine is to require an actual reduction to practice before the patent application is

only address the “file often” problem, not the “file early” problem.

373. These could be potential solutions, but their bluntness has the potential to do more damage than good because they are not, as with an actual reduction to practice requirement, tuned to the problems of early filing or to the actual invention at issue.

374. 3A DONALD S. CHISUM, CHISUM ON PATENTS § 10.06 (2005).

375. See *supra* Part I.A.1.

376. *Frazer v. Schlegel*, 498 F.3d 1283, 1288 (Fed. Cir. 2007) (“The filing of a patent application is a constructive reduction to practice of the invention disclosed therein.”).

examined. Such a solution would work as follows: No longer would an inventor be able to complete the process of invention by simply filing a patent application. Instead, the invention would need to have actually been reduced to practice to be examined by the USPTO. This means that for an invention to be eligible for patentability, it would need to be actually implemented.

While an inventor could initially file her application before actually reducing to practice, she would need to implement her invention in the real-world and make sure the invention produces the intended result prior to being awarded a patent. After this occurred, she would append a textual, and most likely graphical, description of this actual reduction to practice to her patent application, proving to the USPTO that she has met the requirement. There would be no need for the applicant to show the examiner the invention in actual operation. Because of the inequitable conduct requirement, the examiner could simply take the applicant at her word that she actually performed the steps and observed the results described in her patent application.³⁷⁷ If the applicant is not truthful in her recitation of the actual reduction to practice, the patent would be rendered unenforceable by the inequitable conduct doctrine.³⁷⁸

None of the other requirements for patentability would change. The patentability requirements—such as the tests for novelty, the statutory bar, and non-obviousness—would stay the same. The filing date would still operate as the presumptive date of invention to the extent the disclosed invention was reduced to practice.³⁷⁹

The only difference would be the deferred examination by the USPTO of a filed patent application.³⁸⁰ That is, an inventor would file for a patent, but actual examination on that application would be deferred until the inventor submitted her record of an actual reduction to practice. This deferred examination process would mimic the intent-to-use (ITU) application process in trademark law—where, when an applicant files an ITU application for a trademark, she affirms that she intends to use the mark in commerce within a defined period from the date of filing.³⁸¹ If

377. Inequitable conduct provides a self-verification mechanism for statements made to the USPTO, allowing examiners to rely on the threat of patent unenforceability to ensure that statements, such as the success of an actual reduction to practice, are true. See Christopher A. Cotropia, *Modernizing Patent Law's Inequitable Conduct Doctrine*, 24 BERKELEY TECH. L.J. 723 (2009).

378. See *Abbott Labs. v. Sandoz, Inc.*, 544 F.3d 1341, 1353 (Fed. Cir. 2008).

379. For example, if some of the claims were not reduced to practice, then those claims would not be eligible for examination.

380. The concept of deferred examination is nothing new. See *Changes to Practice for Petitions in Patent Applications to Make Special and for Accelerated Examination*, 71 FED. REG. 36,323, 36,323–24 (proposed June 26, 2006) (proposing a deferred examination system, although not keyed off an actual reduction to practice requirement).

381. See 15 U.S.C. § 1051(b) (2006); Barry S. Wilson, Comment, *Registration of Trademarks by the*

she fails to record actual use within this defined period, her ITU application is considered to be abandoned.³⁸² A similar process would work with the actual reduction to practice requirement, with an initial filing prior to actual reduction operating like an ITU and the applicant getting a defined period within which she needs to actually reduce to practice or her patent application is abandoned.³⁸³ An applicant can essentially choose, during this deferral period, whether it is worth going forward with development and reducing it to practice before patent examination ever begins.

Accordingly, inventors would file as early as they do under the current early-filing system. Once the inventor conceives of the invention and can enable it in writing, they can file for a patent. However, the USPTO would not immediately devote any resources to the pending application.³⁸⁴ Instead, the onus is on the applicant to continue with development and, before the deferral period expires, actually reduce the invention to practice in order to get the application examined and obtain a patent. This solution does not change the date of filing, but it does change the date of examination.

B. BENEFITS TO AN ACTUAL REDUCTION TO PRACTICE REQUIREMENT

1. *An Actual Reduction to Practice Requirement Would Generate More Invention Information and Would Reduce Uncertainty When Examination Begins*

By requiring an actual reduction to practice before the grant of a patent, patenting would still be early but not as early as under current doctrine. The inventor would need to proceed further down the technology development path prior to receiving patent protection. The

Intent-to-Use Application, 12 J. CONTEMP. LEGAL ISSUES 110, 110–15 (2001) (describing the ITU process).

382. See 15 U.S.C. § 1051(d); Todd Jacobsen, *Trademark Application Abandonment Under the Lanham Act*, 12 J. CONTEMP. LEGAL ISSUES 120, 121 n.7 (2001) (“Failure of an ITU applicant to file a timely statement of use also amounts to abandonment of the application.”).

383. The defined period in which an initial application must be converted for examination by actual reduction to practice can be changed depending on the invention’s technological area. A good starting period would be to use Japan’s deferred examination period of three years—giving certainty to those wondering if an initial application is going to be examined while providing time for inventors to complete the reduction to practice process. See Japan Patent Office, *Procedures for Obtaining a Patent Right*, http://www.jpo.go.jp/cgi/linke.cgi?url=/tetuzuki_e/t_gaiyo_e/pa_right.htm (last visited Oct. 4, 2009).

384. Deferred examination has this benefit of not utilizing examination resources until examination is elected. See Matthew L. Goldberg, *The Viability of Stimulating Technology-Oriented Entrepreneurial Activity in China, Taiwan, Japan, and South Korea: How Regulations and Culture Encourage the Creation, Development, and Exploitation of Intellectual Property*, 1 INT’L L. & MGMT. REV. 1, 21 (2005) (“Japan has a deferred examination period for patents. Under this rule, a patent application is examined only after a request for examination is filed.”).

actual reduction to practice requirement would force the inventor to perform some successful prototyping and testing before examination begins.³⁸⁵

An actual reduction to practice requirement would generate more technical information about the invention. The inventor would find out how the invention operates under real-world conditions.³⁸⁶ In addition, the inventor would need to develop her invention to the point where those skilled in the art would be sure that the invention works for its intended purpose.³⁸⁷ This pushes the invention closer to commercial viability prior to the election of examination and the patent grant, in turn providing more information about the invention's feasibility.

Additional technical information and definition reduce the uncertainty surrounding the invention before examination begins. The inventor gains a better handle on whether the invention provides the wanted results. Furthermore, the additional time that passes while actual reduction to practice is occurring produces more information of its own. This all places the actual examination forward in time, giving the inventor more certainty as to the invention's ultimate commercial worth.³⁸⁸

Admittedly, the actual reduction to practice requirement does not guarantee the production of market information. The requirement is not tied to commercial viability.³⁸⁹ But, as mentioned earlier, it is unlikely that an inventor would proceed further technically without gathering—either intentionally or by happenstance—more market information about the invention.³⁹⁰ Technical feasibility also gives some sense of market viability because an invention that does not produce the intended result—an invention that would fail the actual reduction to practice requirement—has little market worth. These types of inventions would

385. See, e.g., *Slip Track Sys., Inc. v. Metal-Lite, Inc.*, 304 F.3d 1256, 1267 (Fed. Cir. 2002) (“Testing is required to demonstrate reduction to practice in some instances because without such testing there cannot be sufficient certainty that the invention will work for its intended purpose.”); *Scott v. Finney*, 34 F.3d 1058, 1063 (Fed. Cir. 1994) (relying on a videotape of a prototype of the invention in operation to establish actual reduction to practice).

386. See, e.g., *Mahurkar v. C.R. Bard, Inc.*, 79 F.3d 1572, 1578–79 (Fed. Cir. 1996) (describing the prototypes built by the inventor and the specific tests he performed to determine whether the invented catheter would work well in humans).

387. See, e.g., *Slip Track*, 304 F.3d at 1265 (viewing the inventor's real-world tests of a prototype of his invention to help walls withstand environmental forces through the eyes of a PHOSITA).

388. See *Abramowicz*, *supra* note 14, at 1075–76 (noting that each additional year gives more certainty as to the invention's worth).

389. See *King Instrument Corp. v. Otari Corp.*, 767 F.2d 853, 861 (Fed. Cir. 1985) (noting that to be an actual reduction to practice, the testing does not need to establish that the invention is in a commercially-satisfactory stage of development).

390. See *supra* Part III.A.1–2.

be eliminated prior to the election of examination because they would not pass a mandatory actual reduction to practice requirement.

2. *An Actual Reduction to Practice Requirement Would Reduce the Costs Associated with the Early-Filing Doctrine*

There are many benefits of pushing the examination decision until after actual reduction to practice. Initially, this allows the inventor to make the first decision to commit USPTO resources to examination with more information about the invention and, in turn, less uncertainty about its value. She knows if the invention produces the intended result. She can make a more informed call as to whether the invention is worth patenting. In addition, to get to this stage of actual reduction to practice, she needs to invest more of her own resources.

More invention information and greater resource investment prior to examination reduces the number of conceived ideas that turn into examined patent applications. Examination does not occur until later in the development process—that is, further to the right of the development process depicted in Figure 1 above. By pushing the beginning of examination to this later stage, some ideas will simply not make it. Either the lack of any value will become clear or the inventor will conclude that the potential value of a conceived idea is not great enough to justify engaging in the process of actually reducing to practice in the first place. This lowers the number of patent applications to be examined, minimizing one of the problems with the current early filing system.

There may also be fewer follow-up applications because examination occurs later in time. What is currently a continuation application would turn into an initial application where examination is elected with an actual reduction to practice requirement. Reducing the number of applications to be examined would also lower the number of issued patents. Importantly, this reduction is not done arbitrarily, but is the product of making the inventor go further down the development path prior to examination.

Actually reducing to practice prior to patenting also increases the chances of commercialization. It does this in two ways. First, examination occurs later and under less uncertainty. The inventor, when electing examination by actually reducing to practice, knows more about the commercial value of the invention.³⁹¹ An invention is actually reduced to practice when there are test results that “suffice to persuade practical men to take the risk of commercializing the invention.”³⁹² And the less uncertainty when electing examination, the more likely the patent holder will choose commercialization.

391. See *supra* Part III.A.1–2.

392. *Goodrich v. Harmsen*, 442 F.2d 377, 383 (C.C.P.A. 1971) (emphasis omitted).

Second, the inventor has more invested in the invention when she receives the patent. This means that full-blown commercialization is not as comparatively costly as it is under the current system. Put another way, while the price to acquire the option is higher, the exercise price is lower, making it more likely that those patent options purchased will be exercised—that is, commercialized.³⁹³ Referring to Figure 3 above, the difference between the cost of the option and the cost of exercising is less under the proposed solution.

By making commercialization more likely, an actual reduction to practice requirement makes patent trolls less likely. The choice of asserting the patent is not as cheap compared to commercialization as it is under the current system. Since commercialization is less expensive, given that patenting occurs closer to commercializing, asserting the patent in litigation is not as inviting of an option. The difference in exercise price between asserting the patent and commercializing the underlying technology, shown in Figure 4 above, is less. The inventors who obtain patents under the proposed solution are more invested in bringing the invention to the market. This makes them less likely to turn to patent-troll-like activities. And there are less unused patents—with high commercialization costs—available to those wishing to engage in patent-troll-like litigation.³⁹⁴

The additional invention-specific information produced by an actual reduction to practice also helps to better define the patent's scope of exclusivity. Including a description of the actual reduction to practice in the patent's specification provides more invention information to assist in interpreting patent claims.³⁹⁵

C. FLEXIBILITY OF THE REQUIREMENT HELPS PRESERVE EARLY FILING BENEFITS

Requiring an actual reduction to practice to obtain patent protection has potential negative effects. It delays the issuance of a patent, which may undermine the prospect-oriented nature of the patent system. Such a requirement increases the cost of patenting, forcing an inventor to both expend resources and engage in uncertain research

393. See KELLEY, *supra* note 168, at 106–17 (explaining how building a prototype assists the development process and providing examples from Amazon.com and Apple); THOMKE, *supra* note 168, at 50–51 (arguing that testing and experimentation is crucial to the successful development of new technologies).

394. This situation—acquisition of uncommercialized patents by patent trolls—has occurred before. “Since the dot-com collapse, bankruptcy auctions have been a fruitful source of electronics and software patent rights” for patent trolls. J.P. Mello, *Technology Licensing and Patent Trolls*, 12 B.U. J. SCI. & TECH. L. 388, 392 (2006).

395. See Cotropia, *supra* note 347, at 83–87 (arguing that the use of invention-specific information in the specification minimizes information costs, making determining claim-meaning more efficient).

without the security of patent protection. There is also the potential for small inventors to be priced out of the patent process—unable to reduce to practice because of the lack of resources or expertise.³⁹⁶ Even more resource-rich inventors may be priced out if the invention's reduction costs are abnormally high. The incentive to come up with the initial idea may also be lost.

But all of these critiques fail to take into account the flexibility inherent in the actual reduction to practice requirement. The requirement does not always require extensive testing under actual working conditions.³⁹⁷ Testing needs to go only as far as necessary to establish that the invention works as intended. If, in a given field, computer simulation or laboratory tests satisfy such an inquiry, that is all that is required by the actual reduction to practice requirement.³⁹⁸ The requirement tailors the level of development needed to what is required in a given industry to establish feasibility.³⁹⁹ And feasibility requirements typically adjust with costs and implementation barriers associated with the final, commercial embodiment.⁴⁰⁰

The requirement also does not require proof of a perfected invention.⁴⁰¹ The key is establishing that the invention works, not “*how well* the [invention] works.”⁴⁰² “[T]here is certainly no requirement that an invention, when tested, be in a commercially satisfactory stage of development in order to reduce the invention to practice.”⁴⁰³

This flexibility in the requirement does a few of things. First, the flexibility prevents the requirement from pricing small inventors with fewer resources out of the patent system. An actual reduction to practice is costly, but not as costly as it may seem at first blush. Second, it narrows the gap between the patenting costs of inventions that are cheaper to implement and those that are more expensive. Third, the requirement does not push patenting too far down the development cycle. There is

396. The underlying assumption, that we need to provide patents for small inventors, is not a given. See BESSEN & MEURER, *supra* note 35, at 173–83 (noting that it is unclear whether patents give much value to small inventors).

397. CHISUM, *supra* note 374, § 10.06(2)(a).

398. See *King Instrument Corp. v. Otari Corp.*, 767 F.2d 853, 861 (Fed. Cir. 1985).

399. See *Barmag Barmer Maschinenfabrik AG v. Murata Mach., Ltd.*, 731 F.2d 831, 838 (Fed. Cir. 1984). “Some devices are so simple and their purpose and efficacy so obvious that their complete construction is sufficient to demonstrate their workability.” *E. Rotorcraft Corp. v. United States*, 384 F.2d 429, 431 (Ct. Cl. 1967).

400. See, e.g., *Williams v. Adm’r of the Nat’l Aeronautics & Space Admin.*, 463 F.2d 1391, 1399–1400 (C.C.P.A. 1972) (finding a laboratory test of a component of a claimed spin-stabilized, synchronous communications satellite sufficient to establish an actual reduction to practice).

401. See *Coffee v. Guerrant*, 3 App. D.C. 497, 499 (D.C. Cir. 1894) (“A perfect invention does not necessarily mean a perfectly constructed machine . . .”).

402. *DSL Dynamic Scis. Ltd. v. Union Switch & Signal, Inc.*, 928 F.2d 1122, 1126 (Fed. Cir. 1991).

403. *Id.*

still significant space between the invention and complete commercialization. Thus patents can still act as prospects, but they are prospects that require a bit more front-end work to obtain than they do under the current system. Fourth, the flexibility prevents an actual reduction to practice requirement from forcing the inventor away from the natural path of development in the relevant technological field. The solution does not ask the inventor to do anything different than would be done in the normal course of commercializing the invention—patenting just occurs at a later stage.

Furthermore, technological areas that really benefit from the prospect nature of patents are unaffected by an actual reduction to practice requirement. Technological areas such as chemistry and biology, which are typically championed as the areas that fully utilize the prospect nature of patents,⁴⁰⁴ are already under patentability requirements that de facto force the inventor to actually reduce the invention to practice prior to filing.⁴⁰⁵ For example, to meet the utility requirements set forth in *In re Fisher*, the inventor had to find and prove an end use for the claimed ESTs.⁴⁰⁶ To do this, the inventor already has to actually reduce to practice. This Article's proposed solution changes little in these technological fields.⁴⁰⁷

Placing the actual reduction to practice requirement within a deferred examination scheme helps to further alleviate potential problems with the proposal. There is still early filing shortly after conception, meaning that the patent race is still stopped at the same time

404. Lemley, *supra* note 117, at 141 (noting that the prospect theory makes more sense “when control over subsequent development is a necessary part of the incentive to produce the pioneering invention in the first place, as is arguably true with pharmaceuticals”).

405. Burk & Lemley, *supra* note 54, at 1678–80 (“[T]he inventor can have patent protection for any given molecule only after a substantial investment has already been made in isolating and characterizing the molecule.”).

406. 421 F.3d 1365, 1369–73 (Fed. Cir. 2005).

407. There is still a concern that is worth noting. If a reduction to practice is a requirement, the creation of improvements—inventions that build upon already-patented technology—may be tougher to come by because actual infringement of the earlier patent would be mandated to meet the patent requirements. 35 U.S.C. § 271(a) (2006) (indicating that “use” constitutes infringement); Christopher A. Cotropia & Mark Lemley, *Copying in Patent Law*, 87 N.C. L. REV. 1421, 1432–33 (2009) (describing the blocking patent situation arising from a patent on a base technology and the attempt to develop and patent an improvement). I thank Clarisa Long for this insight.

This concern is likely minimal because an inventor can still file a patent application prior to reduction to practice and then engage in the typical blocking patent bargaining. The single use/infringement requirement to start examination is also so de minimis that the minimal remedies available are unlikely to spur a lawsuit or deter most improvements. Finally, if this is a real problem, then it is one that should already be plaguing those fields governed by the heightened utility and enablement requirements, where a de facto actual reduction to practice standard is being applied. See *supra* notes 404–06.

as under the current system.⁴⁰⁸ This captures the second benefit Kitch articulated to early filing—ending wasteful patent races.⁴⁰⁹

Allowing for an initial filing prior to an actual reduction to practice could facilitate a market for reducing inventions to practice.⁴¹⁰ Even inventors with little resources can shop their initial filing around to find those willing to aid in reducing the invention to practice. Others may monitor the initial filing to see what applications look promising or fit within their company's technical direction and initiate talks with the inventor to assist in reducing the invention to practice in exchange for an interest in the resulting patent right. The creation of this market would both help maintain the incentive for the creation of base ideas and give small inventors a vehicle by which they could reduce to practice and obtain patent protection. Building in a deferral period between initial filing and the beginning of examination provides a nice transition between the existing early filing system and the proposed solution.

Finally, the costs of an actual reduction to practice requirement have to be weighed against the benefits. There is a zero sum here. While alleviated partially by deferred examination, a shift away from the early-filing doctrine is still a shift away and some of the doctrine's benefits are lost. But these negatives have an upside—they minimize the many costs to early filing already articulated. And many of these costs, created by the lack of invention information and uncertainty at the time of early filing, directly frustrate many of the articulated benefits of early filing.⁴¹¹ Thus, while an actual reduction to practice requirement may not allow the patent system to fully enjoy the benefits of early filing, such a requirement is unlikely to make the system any worse off with regards to these benefits.

CONCLUSION

The basic goal of the patent system is the production of socially beneficial technology. That is, technology that society can actually use. The current early-filing doctrine clearly does not facilitate such production. And given the focus of recent scholarship and pending first-to-file legislation, such a solution appears unlikely. While this Article might not propose a perfect solution, the proposed modified actual

408. Filing ends the typical patent race. See Duffy, *supra* note 15, at 499–500.

409. Kitch, *supra* note 12, at 265–66.

410. Others have suggested a market for ideas, albeit before a patent application is filed. See Oren Bar-Gill & Gideon Parchomovsky, *A Marketplace for Ideas?*, 84 TEX. L. REV. 395, 399–402, 421 (2005) (arguing for an idea auction, where if the high bidder in the development stage fails “to produce a patent or product within a given period, say two years” the idea is placed into the public domain).

411. See *supra* Part III.C. (noting how early filing both hampers commercialization and increases patent terms).

reduction to practice requirement is a step in the right direction. Patent reforms can be extremely effective if they are directed at the root of the problems being considered. Here, the problem is the circumstances surrounding the decision to patent. By making this a better-informed decision, reforms can go a long way in mitigating many of the current problems with the patent system.
